Insure VICTORY .... Buy Bonds for War .... Push Plans for Peace

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Contractors and Engineers Monthly

Vol. 42, No. 2 FEBRUARY, 1945 $3 a Year, 25 Cents a Copy

Covering the Field

Highway Construction
Road-mixed concrete to repair base failure was used successfully last summer in Minnesota, as described on this page. The construction of a new approach highway in New Jersey to provide improved access to the major toll bridge over the Delaware River is described on page 39. An article on the resurfacing of 6 miles of Wisconsin Trunk Highway 20 with hot-mix under heavy traffic appears on page 53.

Repairing Old Sewer
The use of liner plates to strengthen 70 feet of 85-year-old brick sewer under a railroad embankment in Detroit is described on this page.

Highway Maintenance
Unusual gravel-handling equipment for stockpiles featured a contract for 100 miles of sealing bituminous-surfaced roads in Texas, as told in the article starting on this page. New Hampshire's annual tar surface-treatment program is outlined on page 11, and on page 68 appears an article on the resurfacing of state highways with asphaltic plant-mixes in western New York.

Airport Extension
The major current activity in the airport field is the extension of present facilities. One such project, including the construction of new hot-mix runways and concrete warm-up and turning pads at Yuma, Arizona, with the contractor working under the handicap of field operations continuing at full pace throughout the job, is described and illustrated on page 2.

County Highways
Various county highway department activities are described in this issue. On page 2 is an article on the Erie County, N. Y., organization, which carries on its work through five divisions, and featuring a typical division garage and shop. While Ellsworth County, Kans., awaits the end of the war and the completion of Kanopolis Dam, which will make considerable change in its road layout, the Highway Department is carrying on its usual activities in the face of a severe labor shortage and is also planning its future highway system. See page 29. How Lake County, Ill., builds its blacktop roads is described on page 75.

Expressways Pay Their Way
How the maintenance of limited-access highways can be paid for through gas-station concessions is outlined on page 6, citing the Merritt Parkway in Connecticut as an example. The story of this Parkway also starts on page 6.

Burned Bridge Restored
A fire-damaged reinforced-concrete bridge over Lake Springfield, Ill., was recently restored by the use of Gunite. See page 17.

(You will find "In This Issue" on page 2)

Concrete Road-Mix Tried Out in Minn.

Failure of Base Weakened By Ground Water Leads to Repair With Lean Concrete Mixed by Traveling Plant

✦ WARTIME highway problems are many and varied. Last summer an unusual approach to one was found in Minnesota where, because of water-retaining shoulders, a new 10-inch gravel base, used to patch an old 7-inch waterbound-macadam base, which had failed in some locations under a traffic load of 500 cars and 50 trucks per day, also failed during the 1944 spring thaw, and a scheme for utilizing the material of the new gravel base as aggregate for road-mixed concrete was successfully carried out. The contract for this work was awarded to C. L. Nelson and R. C. Jones of Brainerd, Minn., by the Minnesota Department of Highways.

The project was located on U. S. 8 east of Wyoming, Minn., where a bituminous road-mix surface, laid 1½ inches thick eight years ago on a 7-inch trap-rock waterbound-macadam base 22 feet wide, had failed in a number of places scattered throughout its 12-mile length. Investigation indicated that the primary cause was the retention of water in the base by the impervious clay shoulders. Accordingly a contract was awarded to remove the old shoulders, utilizing the material thus obtained to flatten heavy fill slopes, and to replace them with

(Continued on page 14)

C. & E. M. Photo
Grouting the salvaged brick sewer under the Detroit Union Belt Railroad.

Chicago Meeting Of Road Builders

✦ ARBA members from New England to south Florida and a good representation from west of the Mississippi met in Chicago, January 16-19, 1945, at the Stevens Hotel for the 42nd Annual Meeting of the American Road Builders' Association to discuss the next moves towards construction, following the passage in December of the new Federal-Aid bill by the 78th Congress. Congressmen who were active in writing the final bill presented the thought of the committees that worked so diligently to produce a nationally satisfactory bill. Major General Philip B. Fleming, FWA Administrator, discussed the status of public works planning, still not issuing at a sufficient pace from the drafting boards of the nation, and Major General Eugene Reybold, Chief of Engineers, U. S. Army, called upon the entire road-building fraternity to accept the growing responsibility to put first things first during 1945,

(Continued on page 55)

Liner Plates Save 85-Year-Old Sewer

Twin Brick Tunnel Under The Detroit Union Belt Railroad Relined for 70 Feet With Steel Plates

By WILLIAM H. QUIRK,
Eastern Field Editor

✦ A double-barrel egg-shaped brick storm sewer running under the tracks of the Detroit Union Belt Railroad in Detroit, Mich., has been relined with galvanized-steel liner plates for a length of 70 feet. The work was done by the Construction Division of Armco Drainage & Metal Products, Inc., of Middletown, Ohio, for $12,465 under contract with the Pere Marquette Railway. This tunnel, one barrel of which was built in 1859 and the other in 1882, was disintegrating, and would either have to be replaced by a new sewer, entailing an open trench excavation at an estimated cost of between $30,000 to $40,000 and considerable inconvenience to the railroads, or relined with a suitable material which would carry the load of five railroad tracks. The relining with No. 7-gage Armco liner plates was decided upon and the Pere Marquette Railway, which does the Union Belt's engineering work, obtained priority and allocation of 24,290 pounds of carbon steel from which to fabricate the plates.

The sewer extends south on 24th Street in the city of Detroit from a connection with a 12-foot, inside diameter, concrete main interceptor sewer which runs beneath West Jefferson Street on its way to the sewage treatment plant. In order to take some of the load from this interceptor sewer during heavy rains, storm water is diverted by means of a regulator into the old 24th Street sewer which empties into the Detroit River. On its way to the river, the sewer passes under the four main-line and one spur track of the Detroit Union Belt Railroad, which tracks are owned jointly by the Pere Marquette Railway and the Wabash

(Continued on page 73)

Unusual Gravel-Loading Equipment On Contract for Sealing Texas Roads

✦ A CONTRACT awarded by the Texas Highway Department to C. Hunter Strain, San Angelo, Texas, for sealing approximately 100 miles of bituminous-surfaced roads in District 16, with headquarters at Corpus Christi, was featured by the use of two ingenious methods for unloading and loading the cover-coat gravel. This job was begun in 1943 but was so delayed due to wartime priorities on the available materials that it was carried over into 1944 and completed last spring.

Advance Stocking of Aggregates

So that there would be no delay in the operations because of a shortage of cover material, the contractor followed a policy of advance stockpiling. Gravel shipped from the Victoria Sand & Gravel Co., Victoria, Texas, to various points convenient to the sections of road sealed under this contract met the following specified grading:

Passing a ⅝-inch screen	100 per cent
Passing a ½-inch screen	90-100 per cent
Retained on No. 10 sieve	90-100 per cent
Retained on No. 20 sieve	100 per cent

Average weight was 2,500 pounds per cubic yard.

For unloading, the contractor used a job-built device consisting of a pipe frame which straddled the side of a gondola railroad car, with a chain from its top cross piece securing it to the far side of the car. Hung on the top cross member were two 6-inch steel sheaves

(Continued on page 26)

C. & E. M. Photo
A novel set-up, devised by C. Hunter Strain, Texas contractor, by which four men unloaded a 50-ton gondola car of gravel in about 2 hours.

Asphalt and Concrete Used in Improvement Of Arizona Airfield

Contractor Licks Problems of Construction at Army Airfield Where Operations Continued Throughout Job

By FRANK B. SARLES,
Western Field Editor

✦ UNDER a contract awarded to the Arizona Sand & Rock Co., Phoenix, Ariz., by the Los Angeles District, U. S. Engineers, the Army Airfield at Yuma, Ariz., was improved during the spring of 1944. Since the existing runways had successfully withstood their intensive use under the earlier training program, only the construction of additional taxiways and warm-up pads was necessary. The use of both hot plant-mix and portland-cement concrete paving and the integration of the construction program with the needs of the Air Forces using the field produced interesting problems of supply and organization.

The work involved the hot-mix paving of four new taxiways, 75 feet wide, and of four transition sections, 150 feet wide and 850, 1,150, 2,384, and 680 feet in length, connecting the runways with the concrete warm-up and turning pads which were included in the contract.

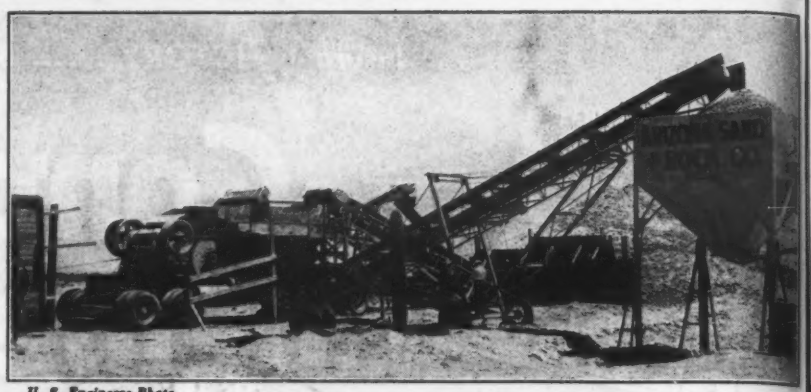
Aggregate Production

A pit located 8 miles from the field offered acceptable material for both the gravel base course and aggregate for the asphalt paving. The contractor used a 1½-cubic-yard Osgood shovel and a ¾-cubic-yard American to load the material into eighteen 5-yard trucks. Hauling from the pit was done on the swing shift only, as the pit was in the line of fire of target ranges. The material was stockpiled close to a Cedarapids screening and crushing plant powered by a Caterpillar D13000 engine. A Caterpillar RD7 with LeTourneau bulldozer fed the aggregate from this stockpile onto a grizzly which permitted all material less than 6-inch diameter to fall onto a belt conveyor, the lower end of which was set in a pit and its upper end discharging into the 9 x 36 primary crusher of the aggregate plant. A second belt conveyor delivered the crushed materials to a 20-ton steel storage bin from which the trucks were loaded by gravity. An average production of 1,500 cubic yards of gravel base per 9-hour shift was maintained.

Since the coordination of construction operations with the needs of the Air Forces necessitated frequent changes from base construction to laying of either type of surfacing or back to base construction, it was impossible to perform all of any one operation without interruption. Arrangements were made to remove the storage bin when production of hot-mix aggregates was in progress, letting the belt conveyor discharge onto a stockpile, the material from which was fed by bulldozers to a trap, located about 100 feet distant, which delivered to a belt conveyor leading to the drier.

Load Testing

The gravel base, which was spread by Caterpillar motor graders, was wet by water from the Post system delivered in a 1,000-gallon tank on a Ford truck or a 3,600-gallon tank on a Fageol truck which also pulled a semi-trailer-mounted tank of 2,000-gallon capacity. Initial compaction was obtained by sheepsfoot rollers, assisted by the equipment used for load testing the subgrade and gravel base. This was a LeTourneau RU Carryall loaded by a crane so that each of the two Firestone 24.00 x 32 tires which supported the rear axle carried a load of 35,000 pounds when weighed on a jack-scale. The loaded scraper, pulled by a Caterpillar D8 tractor, was used continuously for compaction as well as load testing, while the final finish-rolling was done by a 7-ton Ingram 3-wheel roller.



U. S. Engineers Photo
Aggregates for the gravel base course and for the hot-mix paving at the Yuma, Ariz., Airfield were produced at this Cedarapids crushing and screening plant set up about 8 miles from the job.

The Hot-Mix Plant

Aggregate produced by the contractor for the hot-mix paving was fed by a belt conveyor to the Standard Steel Corp. drier, oil-fired with pressure furnished by a 100-hp marine boiler which also heated the asphalt and furnished power for the asphalt pumps and the rams on the batch gate of the asphalt plant. Water for the boiler was pumped from a nearby irrigation canal to a 1,000-gallon steel storage tank.

Asphalt from the Los Angeles plant of the Petrol Corp. was shipped to a siding constructed by the contractor about 100 feet away from the plant and, after being heated by steam from the marine boiler, was pumped to two 8,000-gallon steel storage tanks. A third 8,000-gallon tank provided storage for fuel oil for the drier and boiler.

The Standard Steel Corp. Model 124 asphalt plant, driven by a Caterpillar D17000 engine, mixed a 3,000-pound batch and maintained an average production of 800 tons per 9-hour shift. Trucks hauled four batches per load and were weighed by a scale man on a 50,000-pound-capacity Winslow roller-bearing motor-truck scale. The plant crew consisted of a plant foreman, a pugmill operator, a trap feeder man, a bulldozer operator, a laborer, and two firemen.

Asphalt Laying

A tack coat of MC-1 was applied to the compacted base course, and the 3-inch asphaltic-concrete surfacing was laid in one course. Gradation of the surfacing complied with the following

(Continued on page 23)

Typical Garage-Shop in Erie County

Maintenance of Roads Is Handled by Five Divisions; State Routes Cleared of Snow by County Units

✦ THE Highway Department of Erie County, located in western New York, with headquarters at Buffalo, maintains 1,162 miles of county roads of varied construction. For this purpose the county area of 1,034 square miles, embracing 25 towns, is divided into five maintenance divisions with headquarters at Clarence, East Lancaster, Hamburg, East Aurora, and East Concord. Each division has a garage, machine shop, and small asphalt plant and employs about 50 men for the maintenance of roads and equipment, and for snow removal during the winter months.

County-owned equipment distributed among these maintenance centers includes: 125 trucks from 3 to 10-ton capacity, 50 pick-up and light trucks, 13 tractors, 28 rollers, 23 power graders, 10 convertible shovels, 24 concrete mixers, 124 snow plows, both blade and V-type, and 5 Snogos.

The mileage and types of roads in the Erie County system are as follows:

Type	Mileage
Waterbound macadam (with oil application)	480
Bituminous macadam	229
Traffic-bound macadam	206
Asphalt	127
Concrete	112
Asphalt block	4
Brick	4
Total	1,162

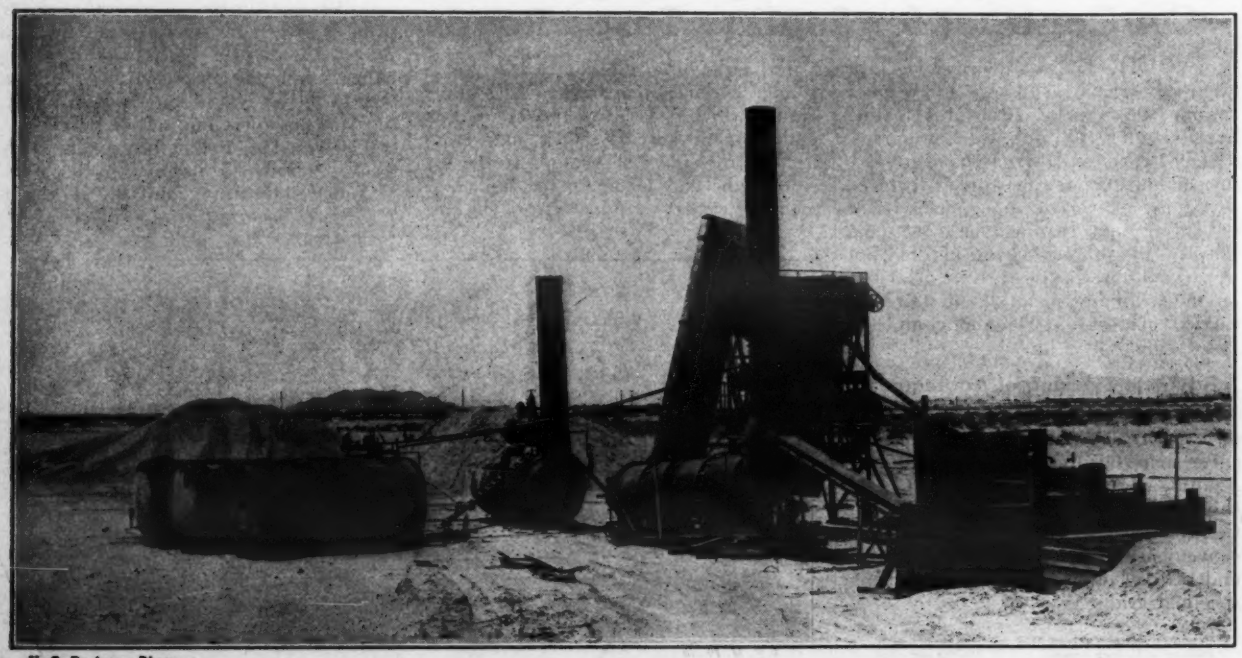
In addition to the county roads, there are 455 miles of state highways and 833 miles of town highways in Erie County, making a total of 2,450 miles of improved roads to serve a population of 798,377.

This county lies in a rather heavy snow belt and the 4-foot fall of snow in October, 1930, has not been forgotten. The State pays the county on a mileage basis for removing snow on 450 miles of state highways. The county also clears 346 miles on its own system, while the town highway departments are responsible for snow removal on the remaining 816 miles.

East Lancaster Maintenance Plant

Maintenance plant No. 2 is located in East Lancaster in the north-central part of the county. The main building, housing the garage, machine shop, and offices, is 42 x 240 feet long, of red tile and brick construction, with a concrete floor and an asphalt-composition roof supported on steel trusses. At the south end of the garage are the offices and wash rooms, occupying an area of 42 x 40 feet. The remaining 200 feet of length on the main floor is given over

(Concluded on page 63)



U. S. Engineers Photo
The Standard Steel Corp. hot-mix plant at Yuma, showing, from right to left, the belt conveyor to the drier, the asphalt plant in the background, the horizontal steam boiler, and the three storage tanks for asphalt and fuel oil.

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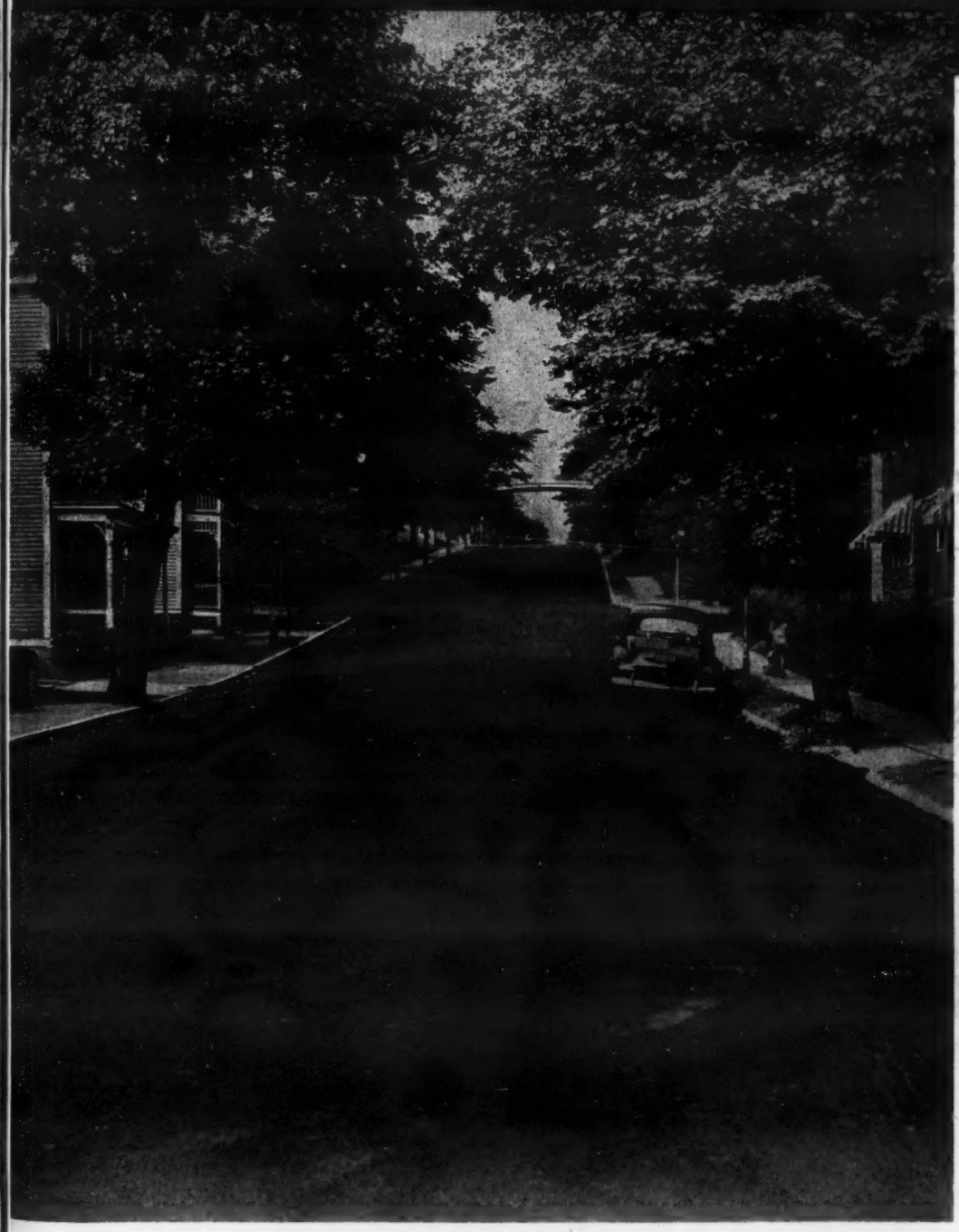
A resilient, joint-free pavement *pays off* in long life and low upkeep



The resilient, joint-free pavement on this Worcester, Mass., street is Texaco Sheet Asphalt

Whether you are going to pave a street, a highway or an airport, give careful consideration to the advantages of resilient, joint-free paving. That's the lesson which 40 years of experience with Texaco Asphalt paving have taught American road builders.

Thanks to their resilient, joint-free qualities, Texaco-paved streets are safeguarded against destructive traffic impact. This factor alone contributes added years of easy-riding service and is largely responsible for Texaco's low upkeep cost.

Remember, too, that because resilient, joint-free pavements keep their smooth, easy-riding qualities for years, they subject motor vehicles, including tires, to a minimum of wear and tear. Always an important consideration, this is especially so in wartime.

All types of Texaco Asphalt paving are resilient and joint-free. Texaco Engineers, who specialize in Asphalt construction, will be glad to help you select the type best suited to your requirements.

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TEXACO ASPHALT

Contractors and Engineers Monthly

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Theodore Reed Kendall, Editor
Frank B. Barles, Western Field Editor — William H. Quirk, Eastern Field Editor
Olive E. Potter, Managing Editor

Edgar J. Buttenheim, President — Donald V. Buttenheim, General Manager
George S. Conover, Vice President — Herbert K. Saxe, Treasurer
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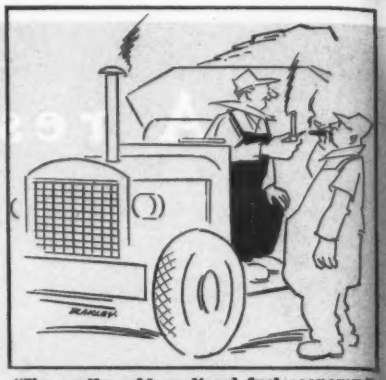
A Lesson From the Seabees

In the introduction to the interesting and inspiring "Can Do!—The Story of the Seabees" by Lieutenant (jg) William Bradford Huie, CEC, USNR, published by E. P. Dutton & Co., Inc., New York, Vice Admiral Ben Moreell, Chief, Bureau of Yards and Docks, U. S. Navy, relates an incident which should be both a lesson and an inspiration for everyone on the home front. In these critical days of the war, with tremendous sacrifice, gallantry, and human suffering on every battlefront, there still seems to be an inexcusable amount of selfishness and concern with personal interest in evidence here at home. This account of the Seabees should provide something, not only to ponder over, but to equal, if possible.

Admiral Moreell says: "There are certain characteristics of the Seabees which are to some extent unique. They are older than their colleagues in the General Service of the Navy, the average age being thirty-one years. Most of them are married and have children and almost all of the skilled artisans are members of organized labor. Most of them could have avoided military service had they chosen to do so, but it is characteristic of the Seabees that they have a highly developed sense of individual responsibility to 'get this thing over with'. That their age is no handicap to their efficiency in work or in combat is attested by the record. They have been educated in the school of hard knocks and hard work, and their fibers are toughened to resist the wear and tear of living and working conditions similar to these which they now find on the battle fronts".

The particular incident mentioned is the conclusion to Admiral Moreell's introduction, "Lieutenant Huie is to be complimented on the work which he has performed in setting forth the accomplishments and ideals of the Seabees and the spirit by which they are animated. This spirit can be summarized by quoting from an answer to a questionnaire distributed to a battalion of Seabees by their Chaplain. Among other questions was this one: 'What can we do to make you more content?' and the answer was: 'Nothing. I got in this outfit to *give*, not to *get*.'"



"I'm really sold on diesel-fuel economy."

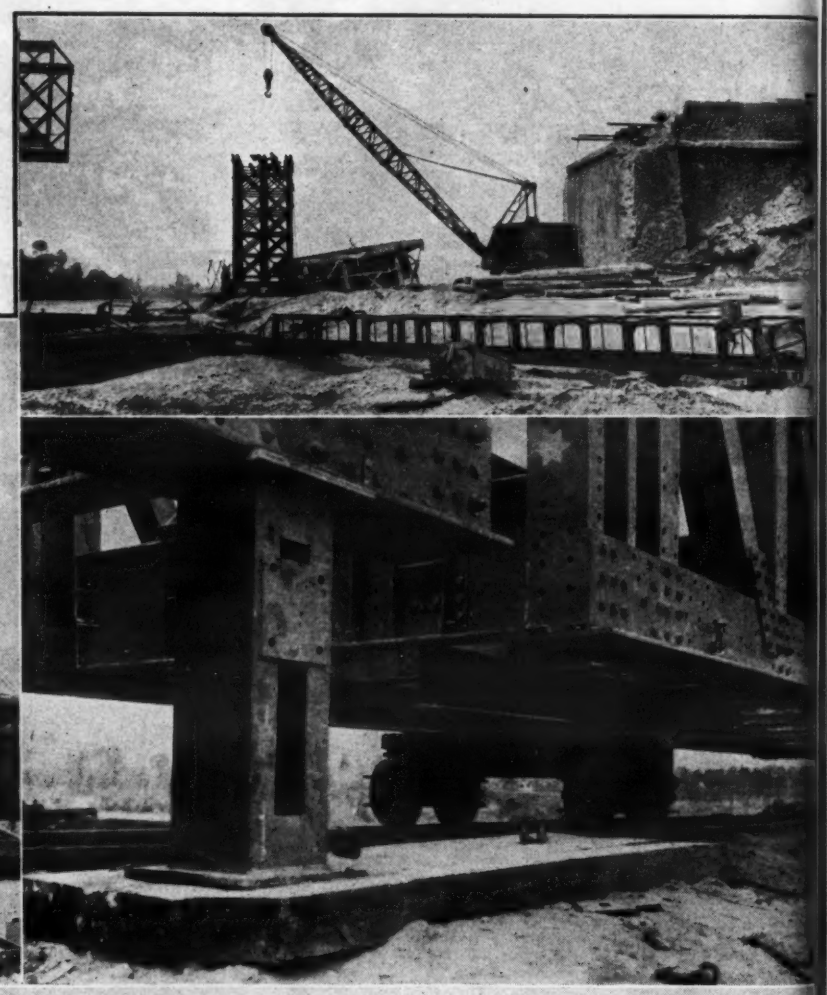
Paper Shortage Critical; Contractors Can Help

A critical shortage in the supply of lumber and pulpwood is again threatening the production of essential war materials in this country. Severe decreases in the output of lumber and pulpwood, due to lack of man-power and equipment, and an increasing need for these products to meet essential military demands are the principal factors affecting the supply of these materials.

Unless action is taken immediately to relieve this man-power and equipment situation, it may be necessary for the military to reschedule some of its essential programs. Much of the available wood-pulp supply is now going for non-paper usages such as explosives, rayon and cellophane, and the requirements for such materials as military shipping containers and explosives are expanding.

Contractor organizations, facing a lull in construction, can aid in this situation by contributing both man-power and equipment to this vital need.

The demand for gasoline in this country during 1944 set a new record of approximately 730,000,000 barrels, compared with 623,000,000 in 1943 and a previous peak of 694,000,000 in 1941. Military requirements for petroleum products have now reached the stage that transportation for civilian use is facing the tightest situation since the war began.



Speedy repair of a railroad bridge in France by U. S. Engineer troops. 1. A crane aids in erecting a light standard unit steel trestle pier to carry the new span for the bridge. 2. A 15-foot top-chord section is placed in the unit construction span which is assembled on trestle stools and then transferred to trolleys for launching over the gap. 3. A close-up of a trestle stool, at the left, and of a trolley at the right. 4. A general view of this bridge site, showing the undamaged structure at the left, the trestle pier erected by our troops, and the unit construction span during launching, at the right. 5. Burning additional holes in top chords to make a splice between spans. The speed with which our Engineer battalions can erect these bridges has been a vital factor in getting supplies up to troops in the front lines.
See page 19.

U. S. Army Signal Corps Photos

MULCH TO IMPROVE ROADSIDES

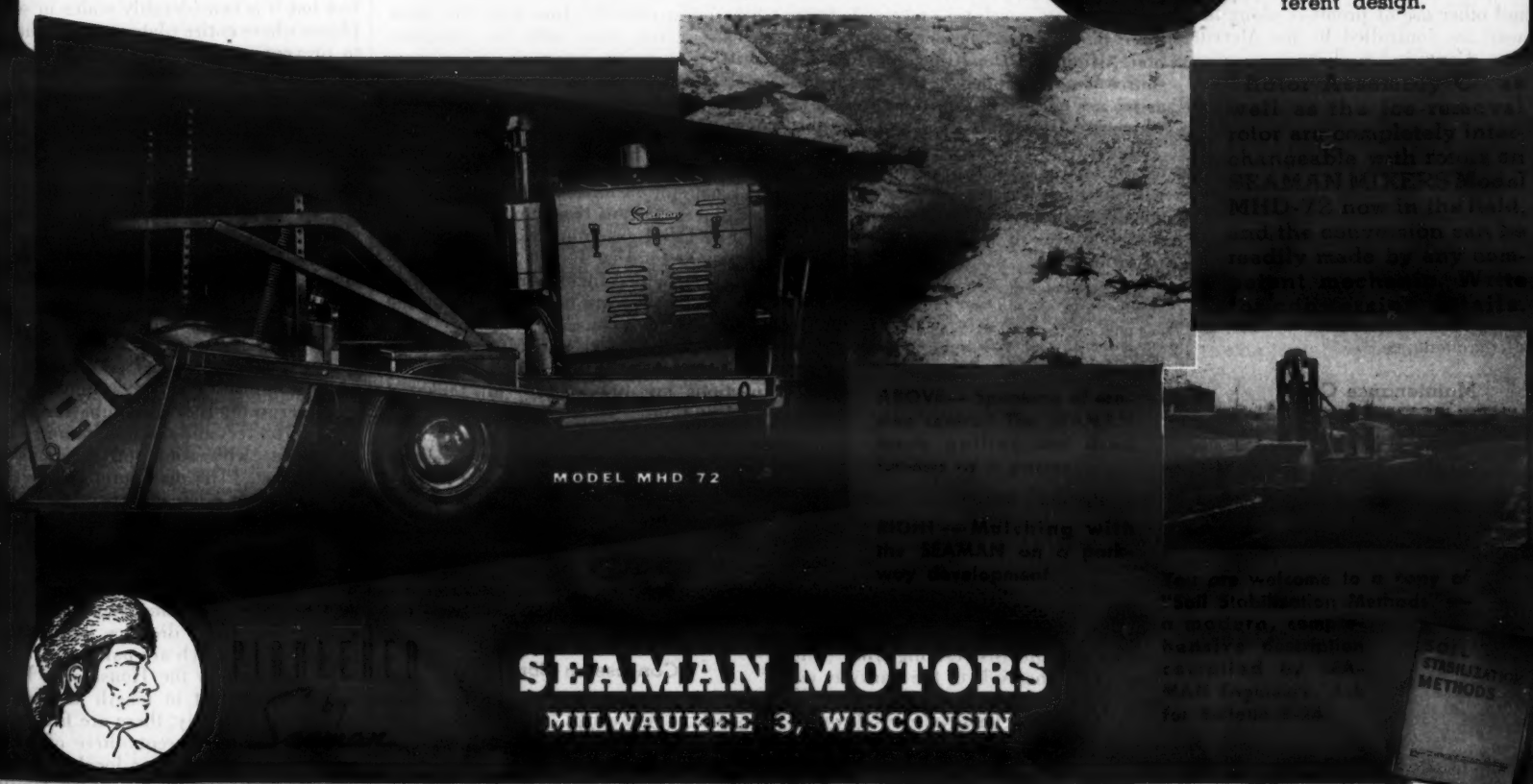
WITH THE SEAMAN PULVI-MIXER

Interest has become widespread in new techniques to improve planting on highway shoulders and slopes. Development in these procedures has ranged from the use of a mulch, — without seeding, — simply to prevent erosion, — to preparation for elaborate landscaped lawns and planting on the entire boulevard or parkway right of way. Mulching, — the mixing of straw, grass hay, peat moss or leaf mold with the top several inches of soil, has a great number of practical advantages. It helps to prevent heavy rains from "sealing" soil and causing heavy water runoff. It reduces winter freezing, thawing and heaving. Mulching increases soil absorption of water and reduces loss by evaporation. And mulching improves soil structure and its plant nutrient qualities.

The SEAMAN PULVI-MIXER is an ideal implement for mulch preparation. With no other tool can straw or other mulching material be so uniformly and completely chopped, milled and mixed with soil, — and with no other tool can depth of treatment be so perfectly controlled. Soil which has been tilled with the SEAMAN, even without benefit of mulching, greatly aids in preventing erosion. When SEAMAN tillage is combined with mulch treatment, not only is shoulder and slope erosion completely checked but the perfectly pulverized seed-bed furthers nitrogen availability — and greatly increases the percentage of seed germination in the subsequent planting.

Another use for your SEAMAN! Further information gladly supplied.

For mulching, for seed-bed preparation and for root and brush removal in land clearance, SEAMAN offers a rotor assembly in which a shock-compensating device permits any one or more rows of tines to stop momentarily when a rock or large root is encountered. This feature prevents tine breakage. The tines resume rotation the instant the obstacle is passed. This rotor construction, designated as "Rotor Assembly C" is the same in the shock-compensating principle as the rotor designed especially for removal or leveling of ice and frozen drifts from runways and highways. The tine, however is of different design.



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ACKNOWLEDGED AS THE MOST EFFICIENT TRAVEL PLANT EVER BUILT!

Limited-Access Highways Can Pay Their Own Maintenance Expenses

Connecticut Experience on Merritt Parkway Proves That Traffic Can Pay the Costs Through Concessions

By THEODORE REED KENDALL, Editor

✦ THE construction of expressways, dual multiple-lane highways separated by 15 to 50 or more feet of center strip, will be extensive in the post-war years. They will cost anywhere from $175,000 to $600,000, and upwards, per mile, depending largely on the character of the terrain through which they pass, the cost of right-of-way, and the extent of development as a parkway. This cost can be paid by bonds amortized from gas-tax income which will soar to new heights when motor vehicles instead of tanks pour from the Detroit Arsenals of Democracy. But the maintenance of these highways will be a continuing expense, with four to eight lanes of paving instead of two, wider center strips to care for, much wider side slopes to mow, and greater numbers of shrubs and trees to prune.

This maintenance cost has been a deterrent to the planning of such highways in a number of instances. To prove that they can pay for maintaining themselves in cash is the aim of this thesis. There are only two expressways where data are available and each of these is a toll road with limited access—the Merritt Parkway in Connecticut and the Pennsylvania Turnpike. The former, however, may be entered and left at twenty-one pairs of roads between the toll booths where the charge is but 10 cents at each end for the 37.17-mile drive, while the latter may be entered only at toll stations upon payment of a charge of approximately 1 cent per mile or $1.50 for an automobile traveling the full 160 miles.

Since the Merritt Parkway offers the better example of a limited-access expressway of the anticipated post-war type, we shall discuss the financial structure of that project.

The speed of traffic, lease of properties and other use of premises along the Parkway are controlled by the Merritt Parkway Commission, but no monies originating from leases or royalties from the sale of gasoline, oil or services at the state-owned gas stations may be used by the Commission. All money must be turned into the state highway fund. Thus, income originating from the Parkway concessions does not go directly towards paying for the maintenance of the Parkway, but it is sufficient in amount, or will be as soon as gas rationing ceases and tires and automobiles are again available in quantity, to offset all cost of maintenance.

Maintenance Costs

The organization for maintenance on the Merritt Parkway is described in the accompanying article; here we present the actual costs and their breakdown by items for comparison. The general maintenance costs for the fiscal year 1943-44, both as totals and cost-per-mile, amounted to:

	1943-44 Total Cost/Mile*	
Office and supervision, overhead	$ 5,656.60	$ 153.00
Roadway maintenance	13,549.27	357.00
Snow removal	15,426.76	409.00
Bridge maintenance	764.89	20.00
Sign maintenance	616.27	16.00
Roadside development	59,715.37	1,571.00
Totals	$95,729.16	$2,526.00

*Cost per mile is based on 38 miles.

For the fiscal year 1943-44 the largest budget item, Roadside Development, was broken down in detail to the following activities and total costs:

Item	Spent
Selective trimming of trees	$ 1,841.55
Patrol roadsides to detect loose boulders, ledge, etc.	112.36
Maintenance of slopes	872.15
Roadside mowing	22,738.49
Clean up debris on roadsides	1,749.22
Destroying insects—not spraying	320.74
Tree maintenance—general	3,815.61
Tree maintenance—spraying	3,565.14
Tree maintenance—young trees newly planted	1,083.85
Maintenance of roadside plantings	274.64
Maintenance of esplanade area	7,117.27
Safety engineering	9.92
Transporting tools—equipment	68.67
Upkeep—replacement of small tools	2,832.51
Loading-hauling-handling materials in stores	182.64
Unproductive personal services (vacations and sick leave)	4,605.38
Rental of storage space—materials—supplies	180.00
Non-rental equipment charges (depreciation and insurance)	8,206.21
Retroactive wages	139.02
Total	$59,715.37

Sources of Income

Income is developed by the Merritt Parkway from two sources: (1) the 10-cent tolls collected at the two ends from traffic which passes both toll houses; and (2) the rents and royalties (exclusive of state gas-tax receipts) received from three pairs of gas stations built by the State Highway Department. The first source is not included in this discussion as we are considering only expressways which are free to all legal motor traffic.

It is of interest, however, to note the extent of traffic on the Merritt Parkway with its peaks, as the volume of motor-vehicle traffic does have a bearing on the second source of income, gasoline-sales royalties.

Merritt Parkway Traffic and Tolls

Fiscal Year	No. of Vehicles	Tolls Collected	Cost of Collection
1939-1940	4,337,681	$493,440	$ 52,130
1940-1941	8,983,697	889,855	81,333
1941-1942	8,996,024	883,640	99,604
1942-1943	3,301,349	322,845	86,977
1943-1944	3,260,086	336,202	110,998

The peak traffic on the Parkway since it was opened occurred on September 2, 1940, when 54,163 cars passed through the Greenwich toll gates in 24 hours, this being the only toll station operating at that time. The peak hour was from 3 to 4 p.m. when 4,691 cars passed the gates. This does not necessarily mean that there was not more traffic on the Parkway, as traffic can enter and leave at twenty-one pairs of roads between the toll stations and many motorists residing from ¼ to 1 mile on either side of the Parkway enter the roadway nearest to a gas station, using it as their local or neighborhood service station.

The Gas Stations

The State Highway Department built the first pair of gas stations on the Parkway in New Canaan in 1940, the next pair at Fairfield in 1941, and the third and last at Greenwich just outside the toll section in 1942. The stations are roughly 15 miles apart and are similar in plan, being built of field stone or brick. Only one at each site has a built-in garage for that station's emergency truck.

The stations are built in pairs for economical operation and are leased as a dual unit in the contracts. They face each other on opposite sides of the Parkway, set back so as to permit driving in from the right-hand or slow lane of each roadway. Standard signs made by the Highway Department are installed 500 feet ahead of the station to inform motorists. By operating two stations as a unit, the lessees can man them with a minimum number of service men in each station. As traffic is almost always heavier in one direction than the other at any given time, with the direction shifting between morning, afternoon, and evening, and as a station can be operated by only two men when traffic is very light, the others can be shifted to the opposite station to handle the increase in business there.

Each station unit has facilities to sell regular gas from two pumps and high-test or Ethyl gas from two others. Storage tanks totaling 16,000 gallons capacity are provided for the dual unit. Gasoline tank trucks are not permitted on the Parkway so a service road was built back of one of each pair of stations to a pit masked by shrubs where pipe connections are provided to all tanks at both stations.

The stations contain a small office for the operators, a lounge for customers, a main service room with adjacent storage rooms, rest rooms, and a telephone pay station which is separated from the other rooms. Each location is attractively landscaped, and, as no advertising signs are permitted and service activities are restricted, the stations blend with the background and in no way mar the scene.

Concession Contract

The dual-unit gasoline stations are leased on competitive bids over and above the stated rental of $500 per month on the basis of the payment which the bidder will make to the state for the sale of one gallon of gasoline of speci-

(Continued on page 30)

THE ANSWER TO EXPRESSWAY MAINTENANCE COSTS

State-owned gasoline stations provide sufficient revenue from leases and royalties on the sale of gasoline to pay for the cost of maintenance of the 37.17-mile Merritt Parkway in Connecticut. This attractive structure in well-landscaped surroundings, devoid of advertising signs, is one of the pair of gas stations on the Parkway in Greenwich, Conn.

The History of the Merritt Parkway, Construction, and Maintenance; the Unit Plan Of Organization Works Well

(Photos on pages 44 and 45)

✦ IN order that our readers may have a full understanding of the operation of the Merritt Parkway for comparison with contemplated expressway projects, we have prepared this article giving pertinent data on construction and maintenance costs and methods. The Parkway extends from the New York State line near Port Chester, where it joins the Hutchinson River Parkway, to Stratford, Conn., where it branches via the Milford Parkway to join U.S. Route 1 to New Haven and northeast whence the Wilbur Cross Parkway will carry post-war traffic north to Hartford. The Merritt Parkway is 37.17 miles in length, which is several miles longer than the distance over U.S. 1 between comparable points, but when traveled at the pre-war and probable post-war legal speeds of 50 mph saves at least 30 minutes travel time with far less driver fatigue, due to the alignment, absence of traffic lights and cross traffic, and the restful natural landscaping.

A total of 134 contracts was awarded for the construction of the Merritt Parkway for work starting in April, 1934, and ending September 15, 1940. The financing was through PWA funds, State Highway Department funds, and $15,000,000 of County of Fairfield bonds carrying 1¾ per cent interest and payable in fifteen years. These are being amortized by payment of $1,000,000 per year and interest from the state highway fund.

The cost of the construction of the Parkway totalled approximately $21,000,000 or about $560,000 per mile, exclusive of the Housatonic River bridge which cost $942,170, as follows:

Right-of-way	$ 6,919,576
Construction	11,684,233
Roadside development	1,679,251
Engineering	901,637
Total	$21,184,697

The average right-of-way width is 300 feet but it is considerably wider in some places where entire plats were purchased to prevent excessive damage due to loss of access. The present dual highway is built entirely on the north half of the right-of-way, leaving the southern 150 feet for future development.

Design

The design is entirely modern in character, with two 13-foot lanes of concrete in each direction, separated by a center strip of grass averaging 20 feet wide and so planted as to simulate the natural tree and shrub growth on either side of the Parkway and to protect opposing traffic at curves from the glare of headlights. The maximum gradient is 8 per cent, the minimum radius of curves 763 feet and the maximum radius unlimited, with some of as much as 25,000 feet. The maximum superelevation at curves is ¾ inch per foot. The minimum vertical and horizontal sight distances are 400 feet on the sections first constructed and 800 feet on the newer sections. Eye level was assumed at 5 feet above pavement grade in computing the sight distance on vertical curves, all of which are parabolic.

In addition to the Housatonic River bridge 1,826 feet in length at the east end of the Parkway, there are fifty-eight highway bridges, twenty-three of which carry the Parkway over local highways and thirty-five of which carry similar roads over the expressway. There is one

(Continued on page 46)

Portraits in Print

By BILL QUIRK

Years of Contracting Don't Dim Bretz' Smile; He's Still Active at 75

✦ ON the right-hand side of the vestibule leading into the main office of Sangamo Construction Co. hangs a picture of Abraham Lincoln. This is the expected touch, for here in Springfield, Ill., where Lincoln lived for a quarter century, the city and its inhabitants still "talk" Lincoln in the same absorbed manner as Hollywoodians might talk of motion pictures, or Washingtonians of politics. Hanging on the opposite wall is a drawing of a shabbily dressed individual, unkempt and run down at the heels, who perhaps has seen better days, beneath which is the legend, "Yeah! I always used to be the low bidder". This represents the personal, human touch of John E. Bretz who, while still taking a keen interest in his contracting business, is bubbling over with the sheer joy of living.

"I've been fifty-five years in this game," says Bretz with a twinkle in his eyes, "and I still manage to keep off the poor farm. And that is more than you can say about a lot of hard-working contractors." This last was added with perhaps a bit of pride, and justifiably so, for Bretz has seen his ups and downs in a career that has covered the construction area from Toronto, Canada, to Shreveport in Louisiana.

Being a low bidder has brought many jobs to Bretz, or "Buzz" as he has been called since childhood when his baby sister had trouble with the word brother, but it has not reduced him to the state of the individual whose drawing decorates the lobby wall. John E. Bretz is a prosperous-appearing, well-dressed, good-looking man who could very well be mistaken for 60 instead of 75. He is of sturdy build, of average height, about 5 feet 9 inches, with grey hair and clear, tanned skin. He still has his own teeth and wears glasses only when reading or writing.

Organized Sangamo Const. Co.

"The Sangamo Construction Co. was organized in 1925 with John Mueth, Jr., as Secretary, B. F. Nelch as Treasurer, and me as President," Bretz said. "It is named of course after Sangamon County in which Springfield is located. B. F. Nelch died in 1934 and was succeeded by his son, Franklyn. We built this present building, which includes the office, warehouse and repair shop, in 1939. In 1942 we dissolved the corporation and formed a partnership, the three original officers together with Bill Kewley who has been working with us for nearly twenty years.

"About the risk," he retorts, "I've been taking risks in the contracting business all my life. That is something you can't escape, whether you are going it alone as an individual, teamed up in a partnership, or acting as an officer in a corporation. All contracting is a risk. But I wouldn't change my life even if I were starting it all over again."

Contracting was inherent in John Bretz. His father came to Springfield from Kentucky and entered the brick-making industry. From making bricks to building with them was but a step. The old brick church of the Immaculate Conception built by the elder Bretz in 1856 at Seventh and Monroe Streets in Springfield is still standing as a monument to the building ability of this family. When young "Buzz" Bretz finished his education at Notre Dame University, he too began building, and for years the name Bretz has been synonymous with building, paving, and contracting.

The elder Bretz knew Lincoln as the prairie lawyer of Springfield, but "Buzz" was not born until 1869 and Lincoln had left Springfield for the White House eight years earlier. "I'm sorry that I did not arrive sooner so I too could have seen him," said Bretz. "My father often talked to me about him. We need someone like Lincoln today."

Pictures of Progress

A series of three pictures hanging on the wall in Bretz' private office traces his activity in the contracting business. The first was taken in 1894 and shows a brick paving job in progress at Fifth and Madison Streets in Springfield. In the foreground is the young contractor directing the operations of grout mixing which, in those days, was done by hand on a wooden platform after which the finished product was shoveled into the street.

The second picture also caught Bretz in action, this time in 1918 building an 18-foot concrete road from Springfield north to Sherman, a section of the highway to Peoria. This was the beginning of the $100,000,000-bond-issue program which laid the groundwork for the Illinois state highway system.

"Back then," Bretz reviewed the scene, "300 feet of paving a day was a record. Look how the aggregate was dumped on the ground and then shoveled into that old steam mixer. Carrying it to those wooden forms in wheelbarrows was a back-breaking day's work."

The final picture, taken six years ago near Logan in central Illinois, illustrates the modern methods of concrete road construction, with Bretz, this time in business suit, admiring his big Rex paver in action as it dumped the concrete into steel forms.

John E. Bretz, President, Sangamo Construction Co., Springfield, Ill.

"I still remember a sewer and pavement job done by the Bretz Construction Co. on North Broad Street in Carlinville, Ill., in 1892," reminisced Bretz. "We

(*Continued on page* 41)

THERE SHE STANDS, the Pioneer plant that is producing 50 cubic yards of material per hour, passing a ½" round, for the longest continuous asphalt job ever undertaken in the State of Texas —43 miles. A Pioneer travelling grizzly feeder receives the quarry material and regulates its flow to the crushing set-up. The first crushing unit is a *Pioneer 20x36 anti-friction jaw crusher* mounted on trucks. Crushed material is carried from the jaw crusher by a 30"x70' Pioneer Belt Conveyor to a 4x10 *Pioneer triple deck vibrating screen*, mounted over a *Pioneer steel bin.*

The oversize is conveyed to two *Pioneer roll crushers*, one equipped with corrugated manganese shells, the other with smooth manganese shells. Crushed material feeds back to the main conveyor thus closing the cycle. The project is typically Texan in size—widening a 20 foot surface to 22 feet and placing a hot mix asphalt concrete leveling and surface course for an average of one inch in thickness over the entire width and for a length of 43 miles. Over 30,000 tons of hot mix asphalt concrete are required.

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Self-Propelled Unit Moves Dirt Speedily

The new self-propelled Terra-Cobra, designed for high-speed earth-moving operations, has positive two-wheel hydraulic steering which gives the operator full control of the unit at all times by maintaining a fixed direction of travel over all types of grounds and at all speeds. No steering clutches nor individual front-wheel brakes are employed. Both drive wheels turn at exactly the same time under full traction and power by means of a single steering bar. As one wheel never idles while the other turns, jack-knifing is eliminated. Braking power is applied by air brakes on the rear of the scraper and equally on both wheels at exactly the same time so there is no chance for either brake to grab.

Powered by a Cummins heavy-duty diesel engine with four speeds forward, plus a reverse gear, the Terra-Cobra, made by Wooldridge Mfg. Co., Sunnyvale, Calif., attains travel speeds up to 20 mph on either short or long hauls. Flexibility of travel over rough, rocky, or uneven surfaces is made possible by a large universal oscillating king pin which couples the prime mover to the heavy-duty scraper. Due to its dual operating action, this pivot allows free radial turning to the right or left while either or both units are tilted in opposite diagonal planes. Thus there is no danger of one unit tipping the other, and twisting stresses and strains are avoided.

The Wooldridge Terra-Cobra has an air-operated cable hoist for handling the scraper bowl and apron. This hoist maintains a constant uniform pull on the cables which does away with jerky starts or stops when reeving in or out.

A complete illustrated bulletin No. TA-425, describing the newest Terra-Cobra, may be secured by writing direct to the manufacturer and mentioning this item.

Rubber Stocks Dwindling, Take Care of Your Rubber

The reserve stockpile of crude rubber in this country has skidded below the 100,000 tons safety level fixed by Bernard Baruch, presidential adviser, according to the WPB. It is reported that the stockpile is now less than 90,000 tons and that, at the present rate of consumption, it might be down to 78,000 by the end of 1945.

Production of 4,000,000 tires a year for the armed forces from additional new plants and the expansion of present facilities to increase production another 6,400,000 tires have been ordered to satisfy sudden military demands for "the most critical of all" munitions programs, Chief of Operations of the WPB has disclosed. Current production is at the rate of 16,400,000 tires a year.

With the nation's rubber stockpile dwindling and the tremendous military demand for tires, General Arnold, Army Air Forces, said recently, "We are now consuming airplane and truck tires at a rate which can't be met even with all plants producing to the absolute limits of capacity. We must exert every effort to get the most use possible out of each and every tire".

Lock Nuts That Stay Put

A grip that holds on against all vibration is the secret of success of a lock nut on any bolt, no matter where it is used. Bulletin 4j-18a issued by Stover Lock Nut & Machinery Corp., Easton, Pa., tells the whole story of self-locking nuts and the features of Stover lock nuts, which are made in ten bolt sizes from ¼-inch to 1-inch. The gripping action of this nut is illustrated and specifications of all sizes are given.

Copies of this bulletin may be secured by writing direct to the manufacturer and mentioning this review.

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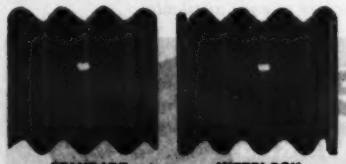

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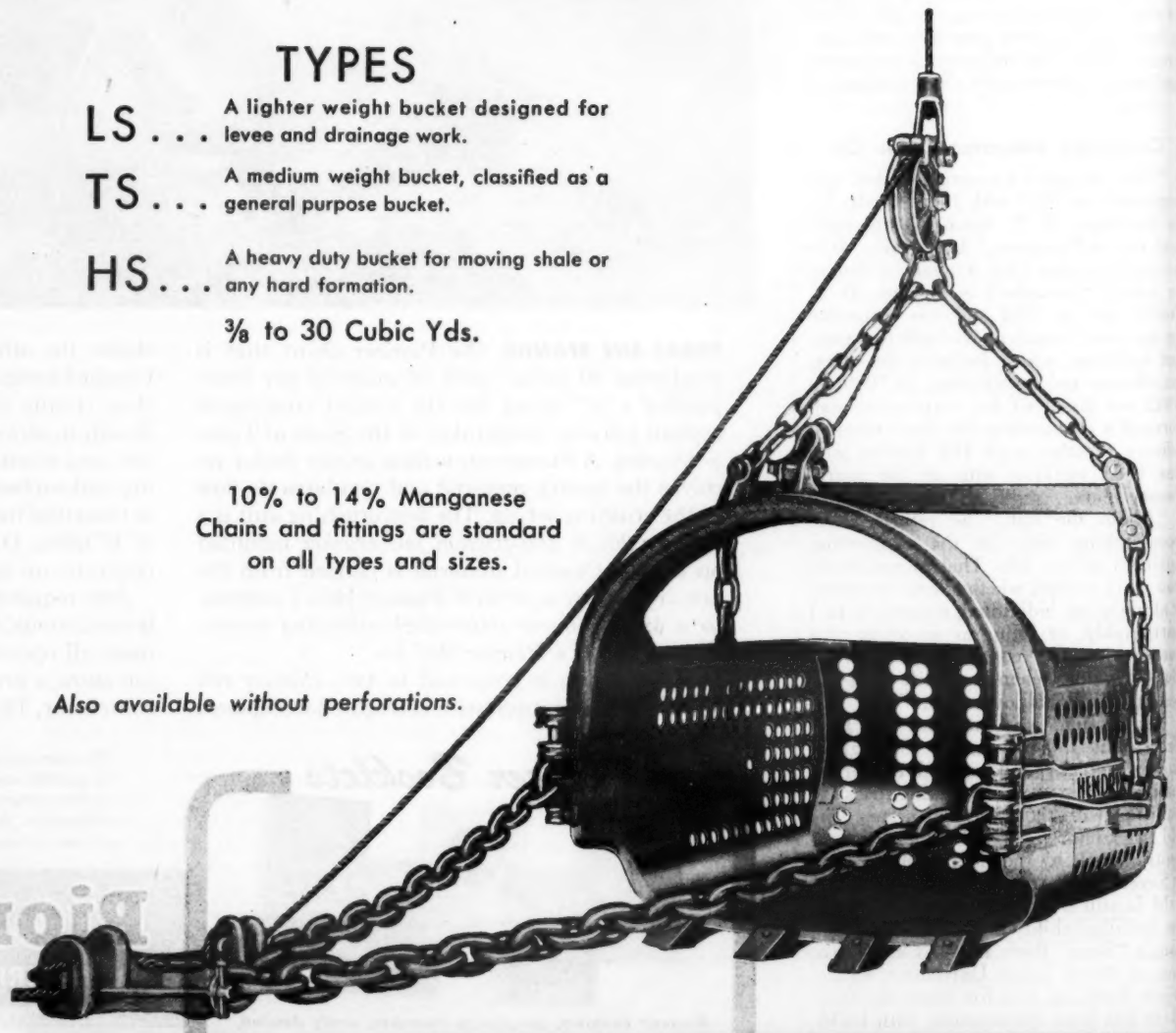

DESOTO FOUNDRY, INC. · MANSFIELD, LOUISIANA

Detroit Expressway Slope Stabilization

Soil Conditions Lead to New Methods of Preventing Slips; Borrow Pits Regraded; Crossing the City Dump

✦ DEPRESSING the last 2½ miles of the Detroit Industrial Expressway (See C. & E. M., January, 1945, pg. 41) just west of the Detroit city line raised some interesting problems for Michigan State Highway Department engineers, particularly in the matter of slip control on slopes. The soil in this area has a top layer of sand, 1 to 4 feet thick, beneath which is a vein of brown clay, 4 to 6 feet in depth. This brown clay is laminated with sand seams through which water can easily pass, making this entire layer a potential source of slides. Further down, blue clay extends beyond the maximum cut on the Expressway. Seepage ground water is in abundance.

The slopes in the depressed section are 1 on 3 and the depth of cuts averaged 16 feet. Two methods of slope stabilization to prevent sloughing were employed when the first cuts were made. One method, for shallow cuts, was to dig a deep vertical trench 3 to 5 feet back of the slope stake line, and lay vitrified-tile pipe with open joints at a grade a little below that of the roadway pavement. The trench was backfilled with porous material so as to intercept ground water.

The second method, for the deeper cuts, was somewhat similar except that two lines of tile pipe were laid. One trench was dug at the rear of the top of slope as before, but this time the pipe was laid at a depth of about half the vertical cut distance. Another ditch was dug half-way down the face of the slope to a depth slightly below the roadway grade and another line of pipe laid there. Both trenches were backfilled as in the first method and water was carried to drains at the sides of the road. In one case a 12-inch line of pipe was laid 35 feet to the rear of the top of the slope on both sides of the cut section, with a series of catch basins to intercept surface water and prevent it from entering the roadway section. This method was used very sparingly because of the cost involved.

New Slope-Stabilization Method

The third method, which was adopted as best suited to existing conditions in the prevention of slides, was to excavate the slopes back for an additional depth of 18 inches from the toe of the slope up to a point 4 or 5 feet from the top of the slope. This removed the fine impervious blue clay and the laminated brown clay so conducive to sloughing and it was replaced with an 18-inch layer of pervious sand which forms a normal outlet for bank seepage. Ground water can thus be controlled and conducted down the slopes into a 6-inch open-joint tile drain which was laid 4 feet below the toe of the slope. This pipe comes in 3-foot lengths and the joints were wrapped either with straw, building paper, or marsh hay. The trench for the pipe was backfilled with slag conforming to the following grading requirements:

Passing 2-inch screen	100 per cent
Passing 1-inch screen	60 to 100 per cent
Passing No. 4 screen	0 to 25 per cent

As a further protection from surface water running down the slopes, dikes were built 4 feet wide and 2 feet high at the top of the slopes. In the sections directly beneath bridge structures, the slopes are paved with quarry stone.

C. & E. M. Photo
Placing an 18-inch blanket of sand for seepage correction on 1 on 3 slopes in a 15-foot cut near Schaeffer Highway Bridge on the Detroit Expressway.

The sand on the slopes was covered with a 4-inch layer of topsoil laid loosely but which compacted to 3 inches when smoothed with a 4-foot-square wooden box float which was manipulated from the boom of a Lorain 75A shovel working along the top of the slope. This imparted a clean well-dressed appearance to the slopes. The topsoil was later seeded

(*Continued on page 37*)

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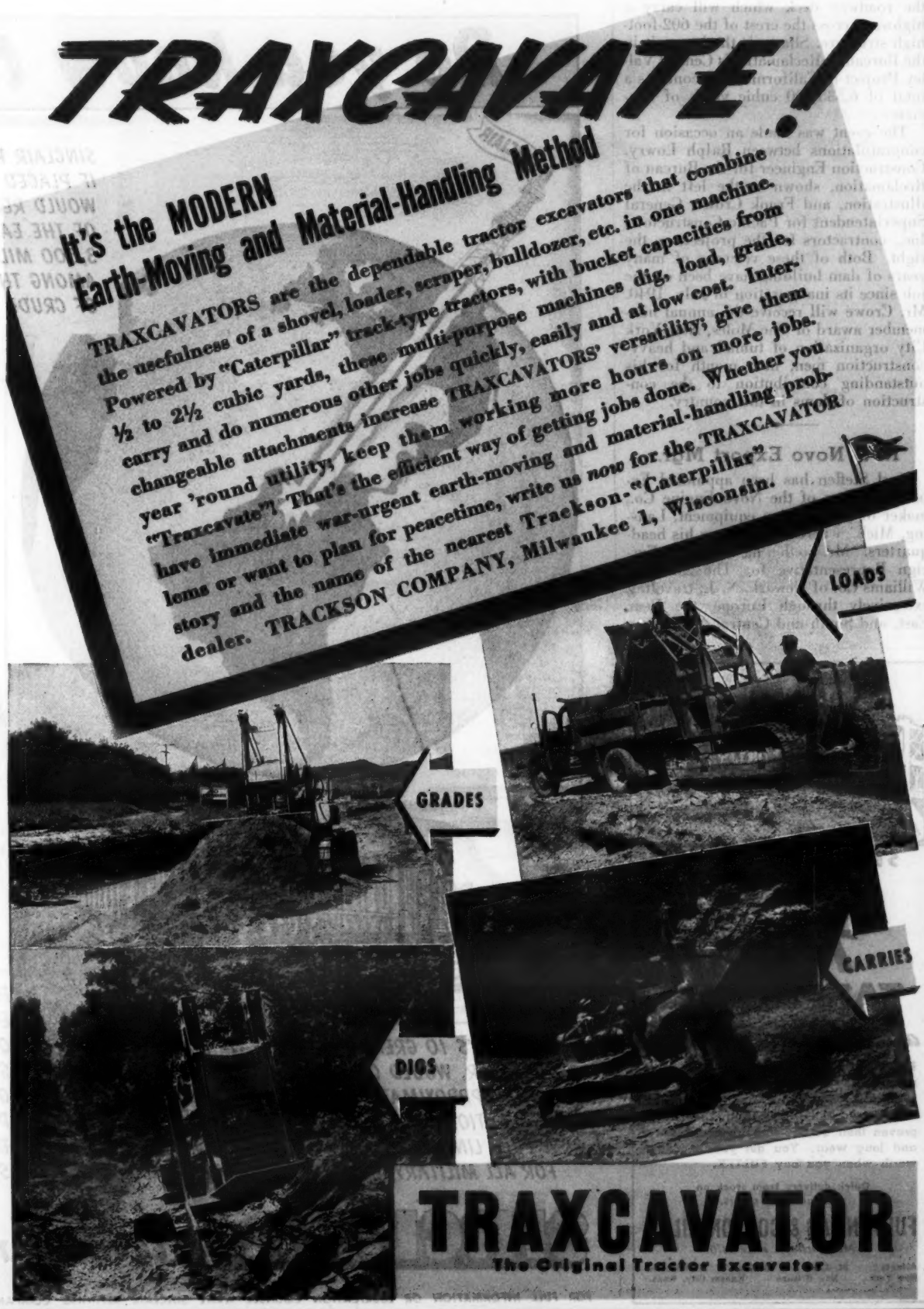
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Final Concrete Pour Made at Shasta Dam

Without fanfare, other than a small local ceremony, the last batch of concrete in Shasta Dam, the world's second highest and largest, was poured on December 22. This final pour took place in the roadway deck which will carry a highway across the crest of the 602-foot-high structure. Shasta is the key unit in the Bureau of Reclamation's Central Valley Project in California, and contains a total of 6,535,000 cubic yards of concrete.

The event was made an occasion for congratulations between Ralph Lowry, Construction Engineer for the Bureau of Reclamation, shown at the left in the illustration, and Frank Crowe, General Superintendent for Pacific Constructors, Inc., contractors for the project, on the right. Both of these veterans of many years of dam building have been on the job since its inauguration in July, 1940. Mr. Crowe will receive the annual non-member award of The Moles, New York City organization of tunnel and heavy-construction men, next month for his outstanding contribution to the construction of dams in this country.

New Novo Export Mgr.

Karl Steffen has been appointed Export Manager of the Novo Engine Co., maker of construction equipment, Lansing, Mich., where he will have his headquarters. Mr. Steffen has served as Foreign Representative for The Sherwin-Williams Co. of Newark, N. J., traveling extensively through Europe, the Near East, and South and Central America.

AGC Nominates Officers at Meeting

At the fall meeting of the Governing and Advisory Boards of the Associated General Contractors of America in November, Harry A. Dick, President, Gilpin Construction Co., Portland, Ore., was nominated to be President for 1945. Warren S. Bellows, President, W. S. Bellows Construction Co., Houston, Texas, was nominated to succeed Mr. Dick as Vice President of the organization during the current year. Two new directors, David A. Olson of Denver and C. Y. Thomason of Greenville, S.C., were elected to fill unexpired terms.

The meeting was devoted to discussion of industry and association problems in the reconversion period, and the need for planning post-war construction projects to the contract-letting stage, for increased labor-relations service, and for improved relations with the public was stressed.

After a thorough discussion of post-war planning problems, led by Fred I. Rowe of Columbus, Ohio, and during which President William Muirhead of Durham, N.C., and Managing Director H. E. Foreman spoke, the Boards approved the plan advanced by President Muirhead as a stimulus to post-war privately financed construction that the owner be allowed the alternative of charging off as depreciation half the cost of a structure in the first quarter of its useful life.

More time was spent discussing labor relations than on any other one subject. A proposal was referred to the Finance Committee for studying means of securing additional funds for expanded labor-relations services by the national and local AGC organizations. E. P. Palmer, New York City, Carl B. Jansen, Pittsburgh, and James D. Marshall, Assistant Managing Director, respectively Chairman, Vice Chairman, and Secretary of the Labor Relations Committee, led the discussions, covering the operations of the Wage Adjustment Board, enforcement of wage-stabilization regulations and the necessity for appointment of general contractors to regional war labor boards, and the future of government wage controls. Heavy-construction contractors recommended establishment of a basic agreement for labor on heavy work recognizing the distinction between such work and building construction.

The fact that good public relations is an invaluable business asset to a general contractor, which cannot be purchased but which must be earned and merited by the manner in which he conducts his business, was stressed in the report of the Committee on Public Relations, of which Dan W. Kimball of Grand Rapids, Mich., is Chairman. The report reviewed the booklet "Good Public Relations for the General Contractor" which has recently been prepared to give suggestions to general contractors on how to merit the confidence and respect of the public.

Other subjects discussed included national legislation, taxation, contract renegotiation, Revised Maximum Price Regulation 251, and surplus war property.

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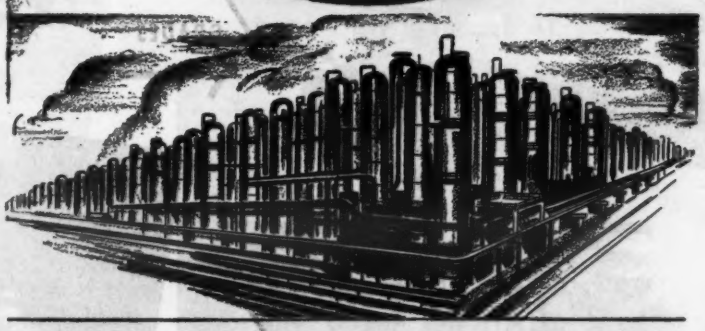

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C. & E. M. Photo
Placing a sand windrow for surface treatment on N. H. Route 10.

Surface Treatment In New Hampshire

Careful Organization and Planning Speed Annual Treatment; Economical Use Of Men and Materials

✦ THE New Hampshire State Highway Department is ever on the alert to speed up the process by which its highways are annually surface-treated in order to keep them in excellent condition year after year. A new system was applied during 1944 whereby the roads were treated in the usual thorough manner with the minimum interference with traffic. These bituminous-treated gravel or waterbound-macadam roads receive a retreatment of T-5 tar into which is mixed and honed coarse aggregate, which is then raked and rolled to form a resilient smooth-riding surface.

The first step is the application of a 4-foot strip of T-5 tar along the right-hand side of the road. A 1,250-gallon pressure distributor using a 4-foot spray bar applies the tar at the rate of 0.2 gallon per square yard. In the middle of this strip, a windrow of sand or fine gravel, 80 yards to the mile for a road 18 feet wide, is put down. Eighteen rented trucks, mostly Fords and Chevrolets, are used for laying this windrow. Each truck carries 2 cubic yards of sand which should make a windrow 132 feet long. These distances are paced off or measured, and the road is marked by white paint or by a small branch or weeds spaced 132 feet apart. Thus loaded trucks do not have to wait for preceding trucks to unload their sand before they too can start dumping. Truck drivers can spot these marked locations and, after a little practice, can so time the speed of their vehicles that they can deposit an even windrow, finishing their 132-foot run with no sand left over.

Special Truck Bodies

A specially designed wooden form which fits in the body of each rented truck facilitates depositing the sand. The form is made from 2 x 6-inch stock and is 4 feet long x 3 feet high backed by 2 x 4 studs. Towards the front of the truck the forms are 5 feet 6 inches apart, while towards the rear they slope on a 30-degree angle to an opening 1 foot 1½ inches wide x 2 feet high, through which the sand is discharged. Fastened to the sides of the truck, to serve as a bearing for the converging form, are 2 x 4 cleats to which the form is attached by ½-inch round bolts. The form extends 3 feet above the floor of the truck so that when the body is elevated in operating position the sand will not spill out over the sides or at the end. On each truck two men with shovels control the flow of the sand through the opening; six men are sufficient to unload eighteen trucks if the hauls from the sand pit to the road surfacing are properly spaced.

On a surface treatment job at Tamworth, in Carroll County, on Route 113 in eastern New Hampshire, the sand came from a nearby pit and was loaded into the trucks by two shovels, a ½-yard Bay City owned by the state, and a rented ⅜-yard Michigan truck shovel. The trucks laying the windrow kept 15 to 20 miles ahead of the succeeding operations of tar application and mixing.

C. & E. M. Photo
Oversize stone on New Hampshire surface treatment is removed by a Huntley rake.

Applying the Tar

The pressure distributor then applies 0.2 gallon of T-5 tar per square yard along half the remaining width of the roadway. In surface-treating a 16-foot width, as in the case at Tamworth, the distributor uses an 8-foot bar covering half the width. On a 14-foot width, a 14-foot bar is attached to the distributor and the entire width tarred in the one operation. This T-5 tar has a specific viscosity ranging from 17 to 26 at 50 degrees C, according to State specifications, and for the work at Tamworth was delivered to a siding at West Ossipee, N.H., 8 miles from the job, where it was pumped from a tank car into the pres-

(*Continued on next page*)

COMPLETE
WELL POINT SYSTEMS
WILL DRY UP ANY EXCAVATION
Faster—More Economically
Write for Job Estimate and Literature
COMPLETE
MACHINERY & EQUIPMENT CO., Inc.
Dept. C
36-40 11th St., Long Island City, N.Y.
Tel. IRonsides 6-8690

● Twenty-five leading equipment dealers in twenty-five principal cities throughout the United States are now authorized dealers for the Wood Roadmixer. More are being appointed. Prospective purchasers and present owners of Wood Roadmixers, wherever they may be, now have access to convenient, on-the-spot sales and service facilities.

The names and addresses of these dealers are shown in this advertisement. See them or write them for descriptive literature and costs on the Wood Roadmixer—the pioneer and leading travel plant method of low cost, high quality pavement construction.

AUTHORIZED WOOD ROADMIXER DEALERS

ALBUQUERQUE, New Mexico
Hardin & Coggins
1717 No. Second

BALTIMORE, Maryland
Albon Tractor Co., Inc.
721-727 E. 25th St.

BILLINGS, Montana
Industrial Equipment Co.,
415 No. 27th St.

CHEYENNE, Wyoming
Wortham Machinery Co.,
517 West 17th St.

CINCINNATI, Ohio
The Bade-Finn Co.
1654 Central Ave.

COLUMBIA, South Carolina
Southern Equipment Sales Co.,
P. O. Box 1341

DES MOINES, Iowa
Herman M. Brown Co.
1st & Sheridan Sts.

DETROIT, Michigan
W. E. Phillips Equipment Co.
7279 Artesian Ave.

HYDE PARK, Massachusetts
Parker-Danner Company
25 Factory St.

JACKSONVILLE, Florida
Florida-Georgia Tractor Company
P. O. Box 1649

KANSAS CITY, Missouri
The G. W. Van Keppel Co.
2440 Pennway

LOS ANGELES, California
Garlinghouse Bros.
2416 East 16th St.

MEMPHIS, Tennessee
Tri-State Equipment Co.
124 East Calhoun Ave.

MILWAUKEE, Wisconsin
Hunter Tractor & Machinery Co.
327 South 16th St.

MINNEAPOLIS, Minnesota
Rasholt Equipment Co.
3138 Snelling Ave.

NEW ORLEANS, Louisiana
Woodward, Wight & Co., Ltd.
451 Howard Ave.

NEW YORK, New York
H. O. Penn Machinery Co.
140th St. & East River

NORFOLK, Virginia
Hampton Roads Tractor & Equip. Co.
W. 39th St. & Killam Ave.

OKLAHOMA CITY, Oklahoma
Herd Equipment Co.
922 N. W. 5th St.

OMAHA, Nebraska
Fehrs Tractor & Equipment Co.
1809 Cuming St.

PHOENIX, Arizona
State Tractor & Equipment Co.
P. O. Box 3795

RALEIGH, North Carolina
North Carolina Equipment Co.
3101 Hillsboro St.

SALT LAKE CITY, Utah
Arnold Machinery Co., Inc.
153 West 2nd South St.

SAN ANTONIO, Texas
J. E. Ingram Equipment Co.
1146 West Laurel St.

SAN FRANCISCO, California
Coast Equipment Co.
948 Bryant St.

WOOD ROADMIXER

Annual Tar Treatment For Highways in N. H.

(*Continued from preceding page*)

sure distributors.

To keep the cost of tar as low as possible, the state is divided into four zones for contract bidding. Last year, 4,500,000 gallons were used, at an average cost of 13½ cents a gallon applied. Outside of the application of tar, all work is done by the state maintenance forces. A zone comprises two or three divisions, each with its own engineer in charge of the surface treatment. All surface-treating is completed in one division before work is started in the next division. This procedure, in restricting the work to a limited area at a time, eliminates that annoying feature to motorists of having to drive over long stretches of roads being tarred.

Graders Follow Distributors

As the tar was applied to Route 113, the Kinney distributor was closely followed by a Galion 101 road grader. A distance of less than 200 feet between distributor and grader was maintained so that the windrow of sand at the side of the road could be quickly spread over the fresh tar, before motorists could cut in and ride over the slippery surface.

The Galion grader moved the windrow of sand over to the center of the road, but still left a 1-foot strip of tar uncovered at the center in order to furnish a good lapping bond with the 8-foot strip of tar to be applied on the other half of the road. A second distributor then covered the remaining half of the road with T-5. A Wehr road grader, following closely behind, spread what was left of the windrow, which the previous operation had brought to the center of the pavement, over the remaining half of the road. To insure an even distribution of the sand, a 1½-ton Ford truck with a snow-plow blade rigged in front rode along the center of the road, smoothing over any irregularities left by the two power graders. A 10-foot-wide Huntley rake, with teeth 10 inches long, fastened to the back of a truck was then pulled over the road. By setting the rake at an angle with the road surface, the operator can throw off on the shoulder any stone over ¾ inch in size.

Hones Mix Tar and Aggregate

The road aggregate, which is pit-run sand or fine gravel, was then mixed with the tar. Three Burch Model C Undr-Truk hones, operating at from 2 to 10 miles per hour, went over the road and did the mixing. The hones were raised or lowered by a Blackhawk Power-Packer hydraulic pump. When thorough mixing had been achieved, so that the aggregate had taken on a uniform black color from the tar and the mix was uniformly spread over the pavement, the Huntley rake was again dragged over the road surface. Any stones larger than ¾ inch that had been picked up by the honing process were thus weeded out and cast off on the shoulder.

The new black road topping was then back-sanded, an operation which covers the surface treatment with a thin coating of sand. A specially designed spreader, developed by the New Hampshire Highway Department, was towed along the center of the road in back of a sand truck at a 25-mile-an-hour speed. This device sprays sand the full width of the road at a rate of approximately 5 cubic yards to the mile. The road was then rolled several times by steel rollers taken from the front end of old steam rollers and pulled by trucks. Traffic, which went on as usual, helped the bonding of the surface.

State Road Crew

On this surface treatment at Tamworth in Division 3, H. L. Smith was Division Engineer in charge, with Charles Sleeper as Maintenance Supervisor. From 12 to 15 miles of 18-foot road was surfaced in this fashion in a 12-hour day from 7 a.m. to 7 p.m. In addition to the eighteen rented sanding trucks and their drivers, an average of twenty-five men make up a state maintenance crew, being dispersed as follows:

Unloading sand trucks	6
Huntley rake and truck	2
Road graders, 3	3
Hones, 3	6
Back sander	3
Shovel operators	2
Utility truck	2
Foreman	1
Total	25

Resurfacing Concrete Roads

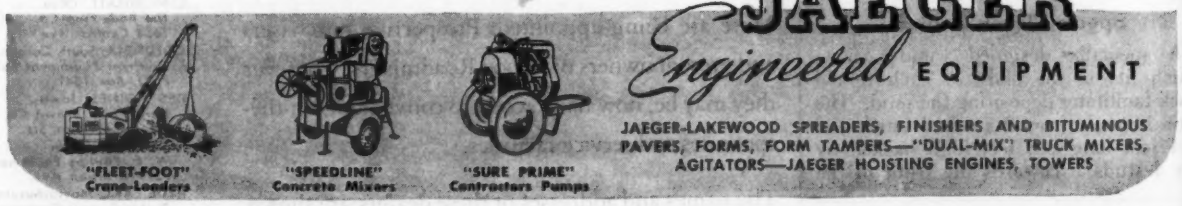
In the bituminous treatment of an old concrete road, an initial coat of approximately 1/6 gallon of T-5 per square yard is applied. This is covered with sand from a windrow along the side of the road at the rate of 40 cubic yards a mile, which is just enough to spread a thin cover over an 18-foot road. About two weeks later, an application of 0.2 gallon of T-5 per square yard is sprayed on top of the first coat, and a fine gravel cover, 90 cubic yards to the mile, is spread on. From here on the process is the same as on a gravel surface treatment, with the road graders, the rake, the hones, the

(*Concluded on next page*)

AIR PLUS
JAEGER COMPRESSOR
VALVED WITH "TOUGH SWEDISH TWINS" FOR
AIR PLUS C-O-O-L-N-E-S-S . . . EXTRA BIG,
AIR-ANIMATED, AND COMPLETELY ACCESSIBLE!

The low temperature and minimum of oil vapor and condensation in the air delivered by "Air Plus" Compressors are evidence of the efficiency of Jaeger's "Tough Swedish Twin" Valves, horizontal fin-cooled cylinder design and an inter-cooler system which automatically unloads and drains during every idling period. All sizes, 60 to 500 feet.

THE JAEGER MACHINE COMPANY, COLUMBUS 16, OHIO



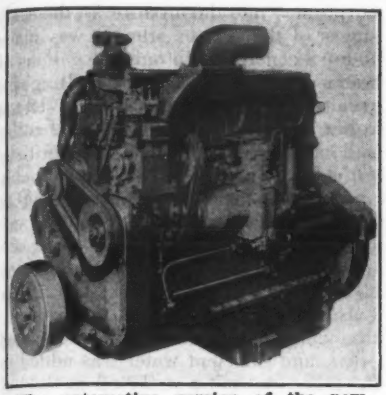
JAEGER *Engineered* EQUIPMENT

JAEGER-LAKEWOOD SPREADERS, FINISHERS AND BITUMINOUS PAVERS, FORMS, FORM TAMPERS—"DUAL-MIX" TRUCK MIXERS, AGITATORS—JAEGER HOISTING ENGINES, TOWERS

The Rud-o-Matic Tagline is operated on a spring principle and maintains at all times a positive tension sufficient to steady a clam shell bucket under any and all conditions, and will operate perfectly with the boom at any angle. It eliminates all the grief usually encountered with the average tagline as there are no weights, tracks, pins, carriages, or sheaves to wear out or to get out of order. Because of the large bearings and fewer sheaves, the saving on cable alone would eventually pay for it.

Tagline is complete with fair lead and cable attached and can be installed in less than one-half hour. Most of the crane manufacturers have adopted the Rud-o-Matic as standard equipment.

McCaffrey-Ruddock Tagline Corp.
2121 E. 25th St., Los Angeles 11



The automotive version of the new Cummins Series NH-600 diesel engine.

High-Speed Diesel In New Larger Sizes

Just thirteen years after the introduction of the Model H American-built high-speed diesel engine by Cummins Engine Co., Inc., Columbus, Ind., this company has announced new Series NH-600 and NHS-600 engines with higher speed and greater horsepower. The increased output of these newly developed 6-cylinder engines is obtained by three major innovations in established Cummins design. The maximum operating speed is increased from 1,800 rpm to 2,100 rpm. The bore and stroke are increased from 4⅞ x 6 inches in the older models to 5⅛ x 6 inches in the larger models which gives an increase in piston displacement from 672 to 743 cubic inches. Dual intake valves are used to provide the increased air supply needed to assure efficient combustion of the additional fuel which the engine requires in order to produce the increased horsepower. Similarly dual exhaust valves permit the rapid exhausting of gases from the firing chamber.

Comparing the 200-hp maximum output of the NH engine with the 150 hp of the parent Model H, it is noted that these improvements in design have produced 33.3 per cent additional horsepower without appreciably increasing the engine weight or dimensions.

In announcing the development of these new additions to the Cummins line, the company makes it clear that manufacture of all existing models will be continued. An illustrated brochure containing complete specifications and engineering data on the new Series NH-600 and NHS-600 Cummins diesels has just been published and may be secured by writing direct to the manufacturer, asking for Bulletin 5206-1 and mentioning this item.

New Mack Director

The appointment of J. E. Savacool, Vice President and Comptroller of Mack Trucks, Inc., as a member of the Board of Directors has recently been announced. Mr. Savacool's affiliation with the company dates from 1913, and includes posts in various branch offices as well as in the home office. He is also a Director of the Mack Mfg. Corp.

USE RIGHT BUCKET FOR THE JOB

Hayward makes all three—clamshell, electric motor, orange peel. A Hayward recommendation is unbiased.

THE HAYWARD CO., 32-36 Dey St., New York

Hayward Buckets

Annual Tar Treatment For Highways in N. H.

(*Continued from preceding page*)

rake again, the back-sanding, and rolling following in order.

"Farmers' Mix" for Town Roads

The state maintenance forces also help towns which do not have sufficient crews to perform their road oiling and sanding operations by furnishing supervision, men, and equipment as needed. Many town roads are surfaced with what is known as a "farmers' mix". A 3-inch layer of gravel is first spread as a top surface on the road, after which a distributor applies T-5 at the rate of 1 gallon to the square yard. A road grader turns this material over, thoroughly mixing the tar and gravel. The surface is then rolled by a 10-ton roller which compacts the gravel to a 2-inch course. Two weeks later another application of T-5, ¼ gallon to the square yard, is made as a seal coat. The advantage of this "farmers' mix" treatment is that it gives to an unimproved road in one year a 2-inch-thick wearing course that would require several years to build up by the regular surface-treatment methods.

Personnel

About 55 per cent, or nearly 1,700, of the state's 3,000 miles of bituminous surface-treated roads were treated during 1944. For the year ending January 31, 1944, the average cost of surface treatment was $488.24 per mile on trunk-line maintenance and $437.60 on State-Aid maintenance.

Frederic E. Everett is Commissioner of the New Hampshire State Highway Department, with LeRoy F. Johnson as Maintenance Engineer.

Peoria Office Moved

The Lincoln Electric Co., Cleveland, Ohio, has moved its Peoria, Ill., office to new and larger quarters in the Electrical Building, 214 Second St., Peoria, Ill. L. W. O'Day remains in charge.

Tire Flaps Can Be Reused But Take Care in Mounting

It is essential that all-rubber tire flaps be salvaged and used again, in order to conserve critical materials, but certain precautions must be taken when mounting used flaps, or danger to the tire and tube will result. A new bulletin, issued by the B. F. Goodrich Co., Akron, Ohio, points out that Goodrich endless rubber truck and bus balloon flaps may be used with any one of several different rim sizes when new, but once used the flap must be remounted on the same-size rim from which it was removed. Otherwise the flap will fail in service, causing damage to the tire and tube.

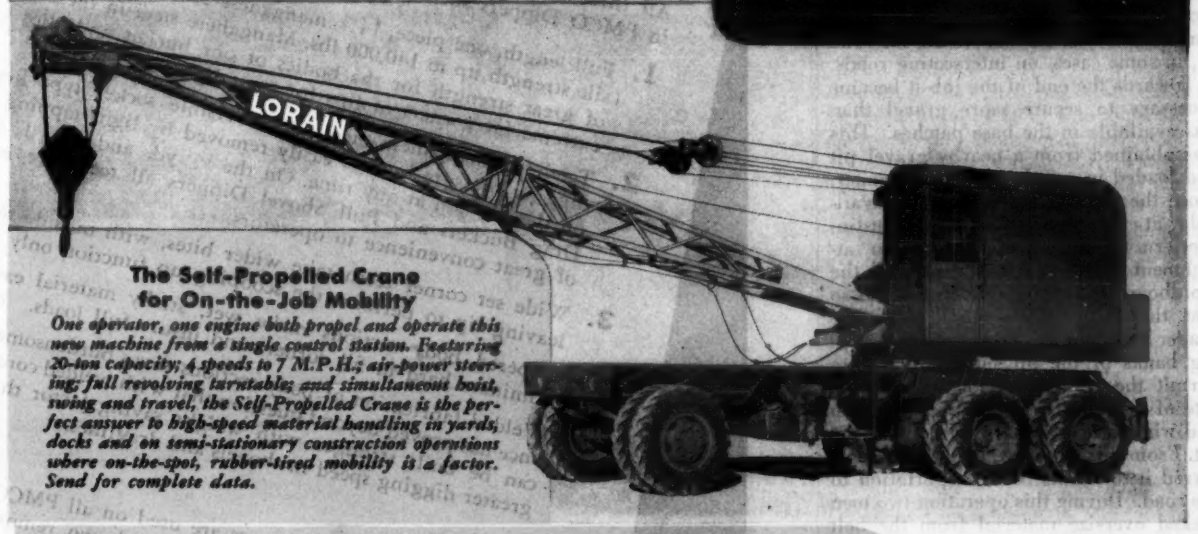
Copies of this bulletin, which illustrates the shape of an endless rubber tire flap when new and the reasons why failure results if the flap is mounted on a different-size rim after being used, and also includes instructions on lubricating flap and tube, may be secured by those interested direct from Goodrich. Just mention this item.

TWO GREAT NEW RUBBER-TIRED DEVELOPMENTS!

First to produce a truck crane 27 years ago, Thew continues its long leadership in building rubber-tired cranes and shovels with these two latest developments — the new Moto-Crane "6x6" and the Self-Propelled Crane. To you and every user, these new machines bring new mobility, broader job applications, new speed and new low job costs. Get the facts now from your nearest Lorain distributor. Plan now on cutting postwar costs, getting the job done faster with these rubber-tired Lorains!

The Moto-Crane "6 x 6"—for Unlimited Mobility

Developed for war use and proved under toughest military conditions, this new, huskier Moto-Crane features 6-wheel drive, exceptional soft-ground flotation and 20-ton capacity. Its eight speeds forward and two in reverse provide the range to move from job to job at 30 M.P.H. or crawl through the heaviest going. The "MC 6x6" is ideal for pipeline and other off-the-road construction where power and traction for tough going must be combined with versatile crane and shovel operation. Send for complete data.



The Self-Propelled Crane for On-the-Job Mobility

One operator, one engine both propel and operate this new machine from a single control station. Featuring 20-ton capacity; 4 speeds to 7 M.P.H.; air-power steering; full revolving turntable; and simultaneous hoist, swing and travel, the Self-Propelled Crane is the perfect answer to high-speed material handling in yards, docks and on semi-stationary construction operations where on-the-spot, rubber-tired mobility is a factor. Send for complete data.

Reg. Trade Mark

thew-Lorain

THE THEW SHOVEL CO.
LORAIN, OHIO

CRANES • SHOVELS • DRAGLINES • MOTO-CRANES

Road-Mixed Concrete For Minn. Road Base

(*Continued from page* 1)

shoulders of semi-porous gravel. This was done by an Austin-Western loader, all the clay shoulders being removed except along the upper sides of super-elevated curves. Pervious replacement material was obtained from local gravel pits and a ¾-cubic-yard power shovel handled an average of 80 cubic yards of gravel an hour to a screening and crushing plant.

When the new shoulders had been placed, the failed portions of the macadam base, aggregating 7,300 square yards in patches from 10 to 275 feet long, scattered throughout the 12-mile job, were removed and replaced with 7 inches of screened gravel having a maximum size of 3 inches, and 3 inches of compacted crushed gravel having a maximum size of 1 inch. This portion of the contract was completed in 1943 and there remained only a seal coat with trap-rock chips to be applied in the 1944 season.

The 1944 spring break-up in Minnesota was more severe than usual and there was a large increase in oil and gas transport trucking over this highway from the Twin Cities to western Wisconsin. Before construction operations were resumed in 1944, there were evidences of displacement of the new 10-inch gravel base placed in 1943 and an increase in the area of the old macadam base showing load distress.

O. L. Kipp, Chief Engineer, and C. L. Methven, Construction Engineer, decided to revise the base repair design, salvaging the gravel already placed as base material by using it as the aggregate for a cement-treated or lean-concrete base.

Mixing the Concrete

Accordingly, the material in the 10-inch gravel base was removed by an Austin-Western 99 loader, augmented by hand shoveling in the patched sections too short for efficient machine operation. Loaded into trucks, the gravel was dumped through a spreader box built of 2-inch lumber, 8 x 4 feet at the top and 6 x 2 feet at the bottom. This box, pulled behind the dumping truck on steel-shod 2 x 8-inch runners, was equipped with a steel strike-off plate, the opening of which could be adjusted by two cranks at its ends. One man, who fastened the truck chains and directed the driver, operated the device. The windrows were formed in convenient locations for several patches, and were placed on wide shoulders along the road or, in some cases, on intersecting roads.

Towards the end of the job it became necessary to secure more gravel than was available in the base patches. This was obtained from a nearby gravel pit and loaded in a rather unusual manner. Since there was no power shovel available at that time, the same Austin-Western motor grader with loader attachment was taken to the pit and the moldboard turned completely around so that the blade faced the driver. The grader was then run up the steeply sloping banks of the pit sufficiently far to permit the reversed blade to secure a bite of gravel which was dragged down and windrowed on the level floor of the pit. From this windrow, the loader transferred it to trucks for transportation to the road. During this operation two men picked oversize material from the belt of the loader and, with the driver and loader operator, comprised the entire crew.

Two men marked off the windrow of material on the road in sections 12.2 feet long and in each section dumped 7 sacks of cement which had been distributed from a flat-bed Chevrolet truck. The same men who dumped the cement spread it uniformly over the top of the windrow with shovels, keeping it dumped and spread about 75 feet ahead of the Jaeger traveling mixer which picked up and mixed the windrow of gravel and cement. The cement content was 3½ sacks per cubic yard, and 35 gallons of water per cubic yard was incorporated into the mixture. In the early stages of the job an attempt was made to use a concrete with only 5.6 gallons of water per sack of cement, rolling the resulting stiff concrete with a 12-ton roller, augmented by a 6-ton steel roller and a Ganley Flat-Iron rubber-tired roller. However, this method was quickly abandoned since the time required to obtain proper density and a smooth surface on the many short half-width sections of base repair delayed progress on all other phases of the work. The rollers were then used entirely in the preparation and compaction of the excavated areas, and sufficient water was added to the mix to permit a strike-off method of finishing the lean-concrete base.

C. & E. M. Photo

A rectangular water tank serving a Jaeger traveling plant preparing a lean-concrete mix for hauling to a base repair job near Wyoming, Minn.

Water for the mix was supplied from a 5 x 6 x 10-foot steel tank mounted on the bed of a Chevrolet truck which was pulled by a chain from the frame of the traveling mixing plant.

The mixed concrete was discharged from the pugmill onto a 50-foot Coyle & Roth conveyor with a 20-inch belt.

(*Concluded on next page*)

A Big 3 in . . . the Material Handling Field

All Purpose
PMCO SHOVEL DIPPERS
PMCO PULL SHOVEL DIPPERS
PMCO DRAGLINE BUCKETS

All three have exclusive PMCO construction features that have proved so successful in PMCO Dippers such as—

1. Full length, one piece, 14% manganese steel fronts and bottoms that develop tensile strength up to 140,000 lbs. Manganese steel in these parts provides foundations of great strength for the bodies of our bucket and allows teeth to be set out at extreme far corners of lips for easy digging.
2. Teeth of manganese steel are reversible socket type kept continually tight by digging pressure but are easily removed by light tapping from behind. No stress on the key pin at any time. On the ½ yd. and ¾ yd. sizes of Shovel Dippers, Drag Buckets and Pull Shovel Dippers all teeth are interchangeable, a feature of great convenience to operators.
3. Wide set corner teeth take wider bites, with outside teeth breaking up material, leaving lip to perform the scooping up function only.
4. Tapered body sections make wet, sticky material easy to dump. Curved backs eliminate hard to fill corners and insure full loads.
5. Welded fabrication of body sections saves burdensome weight up to 30%. Experience has proved beyond question that with welded construction, dippers and buckets can be built stronger with weight saving factor that permits longer booms and greater digging speed in shovels and draglines.

Solid manganese steel fronts are used on all PMCO dippers and buckets. Tapered tooth is shown removed from socket with cotter pin that serves only to keep tooth from falling out. Digging pressure keeps tapered tooth tight in socket.

New Bituminous Tank For Supplying the Job

For hauling bituminous materials from the source of supply to storage tanks at asphalt-plant set-ups or to supply pressure distributors on the job, a new "frameless" supply tank has recently been announced by Littleford Bros., Inc., 485 E. Pearl St., Cincinnati 2, Ohio. Featured by a new type of "frameless" construction which eliminates the use of a trailer frame and provides better load distribution and a lower center of gravity, this new unit has a self-supporting tank and is made in semi-trailer models in sizes ranging from 1,250 to 4,000 gallons.

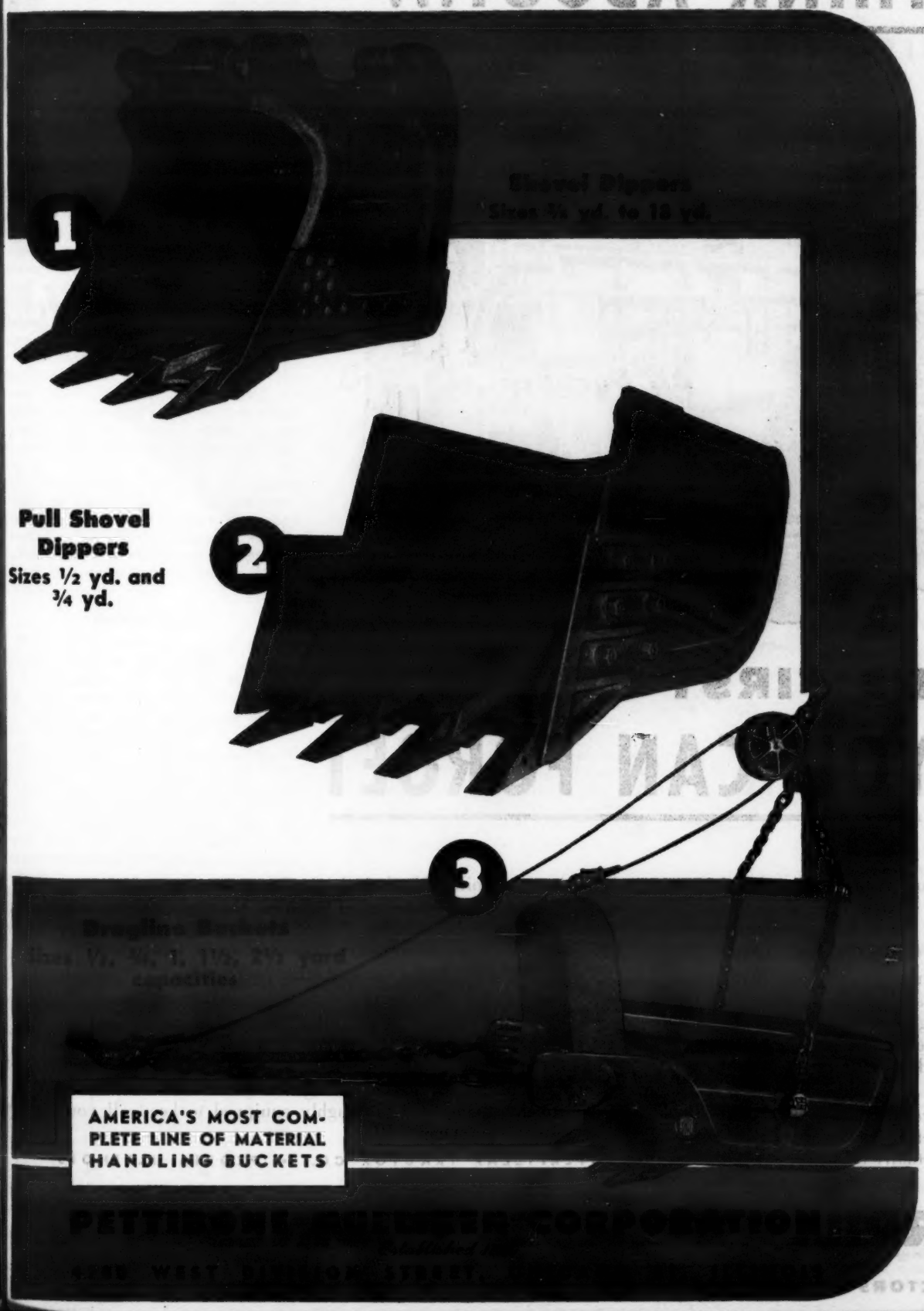
In addition to the "frameless" feature, the new Littleford supply tank is made in two types, Model 102 with vaporizing torch-type burners and Model No. 103 with atomizing low-pressure coilless burners.

State and county highway department engineers and contractors may secure full details on these new supply tanks by writing direct to the manufacturer and mentioning this magazine.

The new Littleford "frameless" bituminous supply tank.

New Davey Dealers

The appointment of Hoye & Williams, 1417 Dalzell St., Shreveport, La., as agent for the Davey line of compressors, power take-offs, and pneumatic saws in the northern Louisiana territory, and the addition of General Machinery & Equipment Co., Inc., 801-15 Woodland Ave., Kansas City 6, Mo., as a new franchise dealer in the territory have been announced by Davey Compressor Co., Kent, Ohio.



Road-Mixed Concrete For Minn. Road Base

(*Continued from preceding page*)

This conveyor was pulled behind the mixer and elevated the concrete, dumping it into trucks with 2-cubic-yard steel dump bodies. The number of trucks varied with the length of the haul from mixing plant to point of use. Because of short runs and frequent moves, no record production was obtained, the best run being 93 cubic yards in 4 hours.

Placing and Finishing

The concrete patches were placed in half widths, 8-inch steel forms being set on the outer edge and along the center line of the road for the first half placed. The trucks, each carrying 2 cubic yards of road-mixed concrete, backed into the section being placed and dumped their loads. Two shovelers distributed the mix, after which the truck was used to pull a strike-off board over the fresh concrete. This strike-off board was made of two sets of double 3 x 12-inch planks, laid flat 5 feet apart and cross-braced with 2 x 6-inch lumber and ⅝-inch iron rods. The ends of the 3 x 12's were shod with iron plates to ride on the steel forms. Between the 3 x 12 strike-off boards and parallel to them, a 2 x 12-inch plank was attached to the brace frame and on it a gasoline-powered vibrator operated, the engine being carried on the back pair of 3 x 12's and protected by a piece of corrugated sheet metal bent to form a canopy over it.

The placing crew consisted of a working foreman, the two shovelers previously mentioned, one of whom doubled on the long-handled wood float, and a fourth man who spent all his time finishing the surface with the float. Curing was done with cotton mats kept wet for 72 hours. Traffic using the other side of the road was kept off the newly placed concrete by 1 x 1-inch stakes 3 feet high, placed in the fresh concrete at 12-foot centers and carrying a square of red cloth at the top of each stake. The stakes were broken off flush with the top of the concrete when they were no longer needed.

Some base patches were placed 6 inches thick, using the dry rolled concrete, but these broke at the unsupported edges under later traffic, so a uniform thickness of 8 inches was adopted. Cylinders of the high-water-cement-ratio concrete, broken in five days, showed an average compressive strength of 554 pounds. A road-mix asphaltic top was later placed on all of these patches.

Personnel

The contract for the 10-inch gravel base on U. S. 8, for the most part east of Lindstrom, Minn., with subsequent modifications, was performed for the Minnesota Department of Highways by C. L. Nelson and R. C. Jones of Brainerd, Minn., bidding as a temporary partnership. Art Doble was Superintendent for the contractor and W. L. Hunsiker was Project Engineer for the Minnesota Department of Highways, of which O. L. Kipp is Chief Engineer.

N. J. Post-War Roads To Be Well Lighted

After the war, New Jersey is to have several hundred miles of new highways to supplement the existing system, and a recent statement by J. L. Hays, Chief, Electrical Division of the New Jersey State Highway Department, indicates that they will be adequately lighted. This is in keeping with the policy whereby 154,192 lighting units served New Jersey municipalities and highways as of 1941. The state highway system alone carried 13,005 units, the equivalent of 500 miles of continuous lighting in a total of 1,637 miles of State-controlled highways.

Lubrication Data For Hand Air Tools

The care of air-driven drills and riveters is most important to their economical and continuous operation. Proper lubrication is one of the factors in preventive maintenance. Vol. 30, No. 11, of *Lubrication*, published by The Texas Co., 135 East 42nd St., New York 17, N. Y., contains a carefully prepared article replete with sectional drawings of air tools and a "How and Why" table on the various conditions which can affect air-tool performance.

Copies of this issue of *Lubrication* may be secured by readers of CONTRACTORS AND ENGINEERS MONTHLY by writing direct to the Advertising Division of The Texas Co.

Preformed Wire Rope In Mechanized Warfare

A Normandy beachhead on D-Day, the interior of a bomber in the South Pacific, and many other scenes where preformed wire rope renders an unobtrusive but very valuable service are a few of the many dramatic scenes shown in a 36-page book recently issued by the Preformed Wire Rope Information Bureau. Some of the uses of this vitally important product are described in the explanatory legends of the ninety photographs of our armed forces at sea, ashore, and in the air in all parts of the world, and many more are listed, making a permanent record of the wartime performance of this prosaic product. The book is dedicated to our fighting men who use it, the workers who make it, and the people at home who have curtailed their use of wire rope so that our armed forces could be served.

Copies of the book, "Speaking of Preformed", will be sent upon request to the Bureau at 520 No. Michigan Ave., Chicago 11, Ill., and mention of this publication.

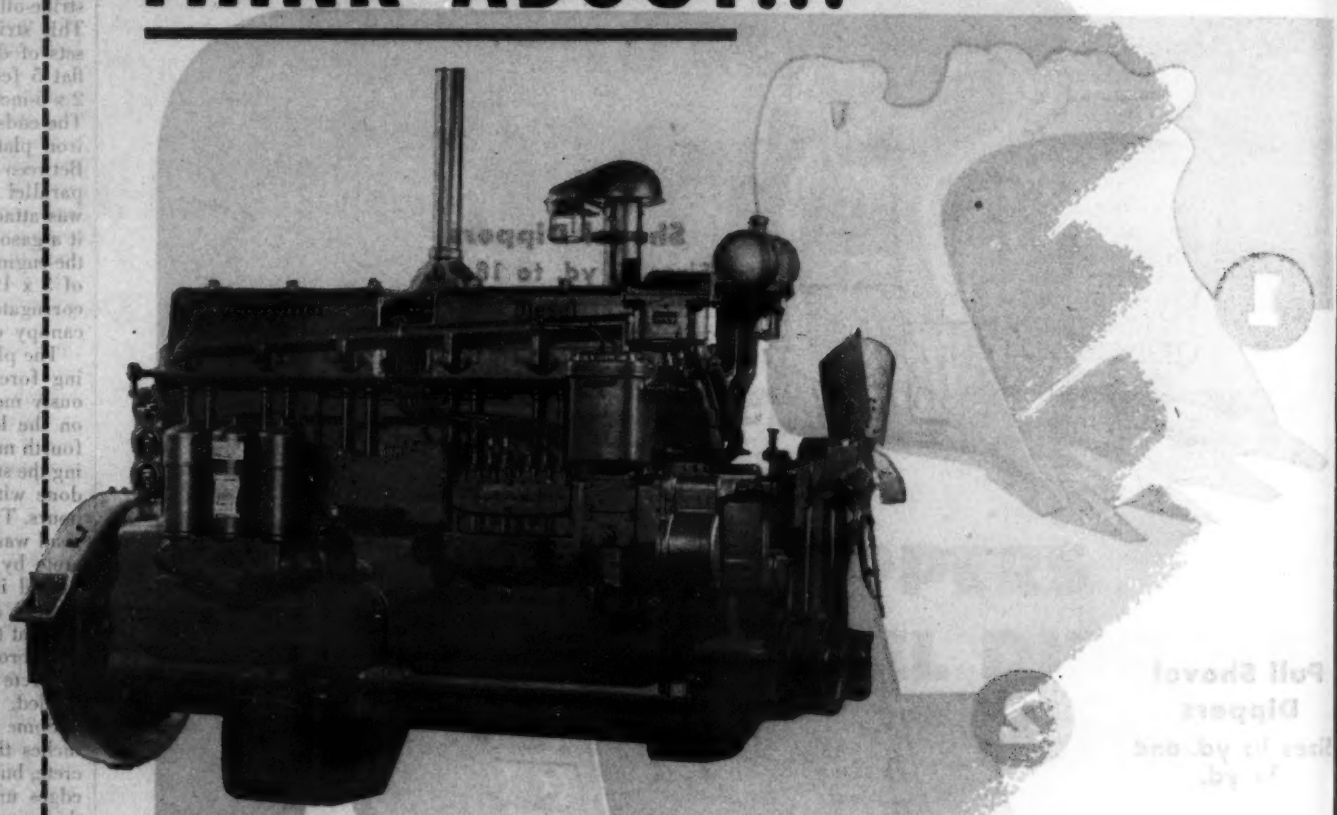
"Sandy" Macwhyte Has Gone

The many recipients of Sandy Macwhyte's characteristic New Year's greetings were saddened by the words attached to it that George S. Whyte, affectionately known as "Sandy", had died suddenly.

The message from Jessel S. Whyte, President, Macwhyte Co., Kenosha, Wis., reports that just the day before Sandy died he reviewed the finished reproduction of his New Year's greetings.

FIRST THING TO THINK ABOUT...

**The horsepower of "Caterpillar" Diesel Engines is* ALL WORKPOWER. *Ratings show sustained output of a fully equipped engine — not the momentary peak performance of a power-plant stripped of fan, pumps or other necessary accessories.*



THEN THE FIRST THING YOU CAN FORGET

The engine—heart of the tractor, motor grader, shovel, dragline, compressor, crusher, dredge, electric set — is decidedly the first thing to consider when setting out to buy equipment for the great era of construction work that awaits the "Go" signal.

Pioneer of Diesel engines for tractors and other earthmoving equipment, "Caterpillar" Diesels have undergone more than thirteen years of grueling tests and engineering refinements. They've won their stripes for dependable service on every fighting front; and they've rolled up mighty records on thousands of construction and industrial tasks.

*These simple, husky engines are strictly work engines.** Correctly designed, carefully manufactured, and literally free from operating adjustments, they can virtually take care of themselves. With the "Caterpillar"-built fuel injection system, their fuel economy is one of their most-talked-of features. Maintenance costs over the years are unbelievably low — for these engines are given every possible protection against wear. They operate efficiently in frigid cold or torrid heat; in the rarefied atmosphere of high altitudes or at sea-level conditions.

Prompt and efficient "Caterpillar" inspection, repair and replacement parts service is always near at hand. While the war has "made holes" in many distribution-and-service systems, the nationwide "Caterpillar" service-dealer organization has remained intact . . . strong, capable and thoroughly equipped to keep all your earthmoving equipment rolling.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

CATERPILLAR DIESEL ENGINES

REG. U.S. PAT. OFF.

TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

Fire-Damaged Bridge Repaired With Gunite

Lake Springfield Structure Spalled by Gasoline Fire Is Completely Restored by Contract in Two Months

✦ THE 1,700-foot reinforced-concrete bridge over Lake Springfield, Ill., damaged by gasoline fire, was speedily repaired by the use of Gunite. Built in 1933 of reinforced concrete throughout, the bridge has thirty-four 50-foot spans carrying a 40-foot roadway with two 5-foot sidewalks, the weight of which is spread over nine beams supported on five-column bents resting on concrete piers.

Fire Envelops Span

The fire started when a 4,000-gallon truck-trailer gasoline carrier overturned on the bridge which is located 7 miles south of Springfield on U. S. 66. The resultant explosion killed the driver, and set on fire the gasoline which poured over the concrete bridge deck and ran through the row of scupper holes placed in the roadway alongside each curb for drainage. The flaming gasoline soon enveloped the concrete girders, columns, and piers under the deck slab.

The accident occurred near the southern end of the bridge on span 27 which suffered the greatest damage, although the two adjoining spans were also somewhat spalled by the heat. Strangely enough, the fire did less damage on the deck where the truck cracked up than it did to the beams, columns, and piers below. As the liquid fuel ran down the scuppers, it spread out over the bottom of the bridge superstructure, covering the bents and foundation above the water line. A brisk breeze aided the flames in generating a terrific heat which caused the reinforcing steel in the structure to expand, cracking and spalling the concrete around it. When the fire ceased and the smoke finally cleared away, an inspection of the concrete, once clean and white but now blackened from the fire, clearly indicated that the bridge would have to be repaired at once before the beams were further weakened by exposure.

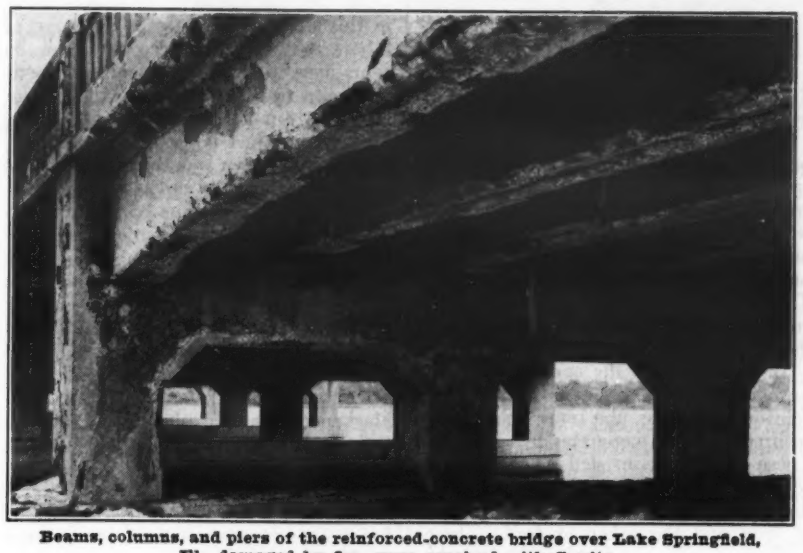
Repairs Start

Restoration work was begun in September, 1944, by the Gunite Concrete & Construction Co. of Kansas City, Mo. The under side of the bridge could be worked on only from boats so the City of Springfield granted to the contractor the use of four steel barges, 40 feet long x 12 feet wide x 6 feet deep. These barges were lashed together and then moored lengthwise beneath the bridge, occupying the entire area beneath span 27. The steel decks of the barges were flush with the sides, making a smooth platform for the easy movement of men, construction material, and equipment. Scaffolds consisting of wooden horses and boards were set up on the barge decks. Two men then chipped off the loose concrete with Ingersoll-Rand pneumatic drills operated by a Sullivan 227-cfm portable air compressor driven by a Buda gas engine. This unit was placed on the roadway of the bridge immediately over the span being repaired, so that no more than 75 feet of hose line was needed to bring air to the drills which operated at 100-pounds pressure. The drillers, wearing transparent shields over their faces as protection from flying fragments, removed the crumbly concrete for an average depth of 3 inches. On the two outside curved beams, however, which were gutted more than the others, the concrete was removed for an average of 18 inches upward on the sides from the bottom of the beam and for a depth of 4 inches, exposing the steel reinforcing.

New Reinforcing

The beams were then faced with a 3-inch mesh of No. 10 wire which came in 30-inch rolls. As the beams are 18 inches wide, a 6-inch strip was turned up

(*Concluded on next page*)

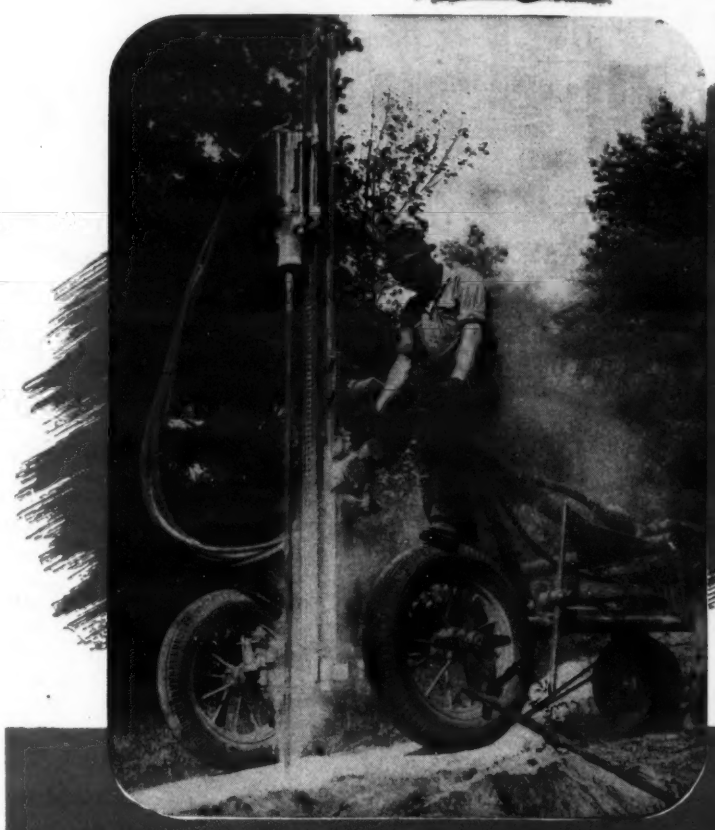


Beams, columns, and piers of the reinforced-concrete bridge over Lake Springfield, Ill., damaged by fire, were repaired with Gunite.

"BICKNELL BETTER BUILT"
PAVING BREAKER TOOLS

We manufacture a complete line of tools for pneumatic paving breakers, rock drills and diggers.
Write for descriptive circular
BICKNELL MANUFACTURING CO.
2 LIME STREET ROCKLAND, MAINE

FOR THOSE Tough DRILLING JOBS!



THE SULLIVAN UNIVERSAL WAGON DRILL

Every construction man knows that a difficult drilling job can tie up an entire project and throw the complete schedule off. It's that kind of a drilling job that's made to order for the Sullivan Universal, a mediumweight rig that takes the tough jobs right in stride.

The Sullivan Universal has four exclusive features that will help you finish your tough jobs on time and will do it at lower cost. Check these features now; see how they can mean more footage drilled per shift and lower upkeep costs. Then, be sure your next wagon drill has every one of these outstanding features:

BRAKES—Make moving quicker and easier and reduces setup time. Increases footage per shift because more time is allowed for actual drilling.

"A" FRAME—Braced support of "A" frame insures rigid support at all drilling positions. Result: Fewer broken steels.

HYDRAULIC CONTROL—Permits quick easy positioning of drill and feed. Hydraulic lift can move drill, feed and supporting arm from ground level to 6 feet in the air. No worm gears, cranks or hand operated hoists are necessary.

SULLIVAN "PISTONMOTOR" FEED—Especially designed for rock drills only. Efficient controls permit quick retraction of drill steel for any variation of speed and pressure.

Bulletin 87-T-1 describes these, and additional features in detail. Write to the nearest Sullivan office for your copy. Sullivan Machinery Co., Michigan City, Ind. IN CANADA: Canadian Sullivan Machinery Co., Ltd., Dundas, Ontario.

SULLIVAN
CONTRACTORS' EQUIPMENT PROVED THE WORLD OVER
FACTORIES: MICHIGAN CITY, IND. CLAREMONT, N. H.

OFFICES: Birmingham • Boston • Butte • Chicago • Claremont • Dallas • Denver • Duluth • El Paso • Huntington • Knoxville • Los Angeles • Middlesboro • New York • Pittsburgh • Portland • Salt Lake City • San Francisco • Seattle • St. Louis • Washington, D. C.

PRODUCTS: Portable Compressors • Stationary Compressors • Rock Drills • Wagon Drills • Core Drills • Portable Hoists • Sharpeners • Paving Breakers • Trench Diggers • Sheeting Drivers • and other Pneumatic Tools.

Bridge Repair

(*Continued from preceding page*)

on each side of the mesh so that the section could be wired to the reinforcing rods. For ease of handling, the mesh was cut with nippers into 5-foot lengths and when placed along the bottom of the beam had a 6-inch lap at each junction. The wire was light enough so that it could be bent by hand to the shape of the beam.

In places where the concrete did not have to be chipped off as deep as the reinforcing rods, the new mesh was secured to the concrete by anchors. These anchors consisted of a ¼-inch rod, 3 inches long, which threaded through two cone-shaped washers, one of iron and the other of lead. These washers were secured at one end of the anchor, and could be driven into the concrete by placing a hollow tube over the rod and driving the anchor into a drilled hole. The iron washer was thus forced into the lead washer which consequently expanded, securely locking the anchor into the concrete. The mesh was then wired to the anchors set along the sides of the beams.

Placing New Concrete

A Model N-O Cement Gun, requiring a minimum of 125 cubic feet of actual free air at 60-pounds pressure per minute, was set up on the bridge deck near the air compressor to apply the new concrete surface. Portland cement in bags was stored on one side of the gun while a load of clean, sharp, fine sand with from 4 to 8 per cent water content was stockpiled on the other side. Dry-mixed cement and sand in the ratio of 1 to 3 was placed in the upper chamber of the two-compartment cement machine where the pressure is alternately off and on. The mix then passed into the lower chamber which is always under pressure from the air compressor. The dry mixed sand and cement was next forced through a stout rubber hose, 1-inch inside and 1¾-inch outside diameter, at the end of which was a nozzle where water was added from a connecting line.

The nozzle pressure of the dry material averaged between 45 and 60 pounds, according to the moisture of the sand; the drier the material the less pressure was needed. Pressure on the water line was around 10 pounds more than that of the material line. Water for the operation was pumped directly from the 14-foot-deep lake by a double-cylinder air pump located on the barge deck. The nozzle man increased the pressure on the water line as needed by stepping up this small air pump without having to adjust the compressor itself.

On the two arched outside beams, wooden "shooting" or guide strips were wired to the reinforcing in order to secure true lines and camber. Sixteen-foot strips of 3 x ⅞-inch board were used, along one edge of which a 1¼-inch chamfer strip was nailed. With the strips in place, shooting began, with the nozzle man directing the stream of sand, cement and water against the bottom of the beam first and then moving towards the top. The Gunite was built up in layers until the concrete conformed with the original outline. Encasing the beams with reinforced Gunite restored the design to the structure.

Sand Blasting

When the bridge had been structurally repaired, the Cement Gun was used to remove smoke and oil stains from the remaining affected parts of the span. The dirty concrete was cleaned by sand blasting, dry sand being forced through the machine and out the nozzle.

Personnel

Ordinarily Gunite work of this type requires an average crew of eight, but in this instance, due to the shortage of labor, the work was accomplished by four men, a superintendent, a nozzle man, and two drill operators. A ladder from the top side of the bridge to the barges furnished access to the working area. The project was completed in two months, September and October, 1944, with about half the time spent in removing the burned and disintegrated concrete and the remainder in placing the new mix. The job was paid for on a contract basis according to the number of sack batches of Gunite that were used with a bid price per sack batch; 800 sack batches were required. The bid price included removing the spalled and blackened concrete, placing the Gunite, and sand blasting the blackened areas, but additional payments were made for the wire-mesh reinforcing.

This contract for the restoration of fire-damaged spans of the Lake Springfield Bridge on U. S. 66 south of Springfield, Ill., was awarded by the Illinois Division of Highways, Wesley W. Polk, Chief Highway Engineer, to the Gunite Concrete & Construction Co. of Kansas City, Mo., for whom W. J. Gregory was Superintendent. The work was in District 6 of which Carl M. Wahl is District Engineer, with headquarters at Springfield. Resident Engineer on the bridge was Edward Warren.

New Dealers Are Appointed To Handle Wood Roadmixer

Eleven new distributors have been appointed by the Wood Mfg. Co., Los Angeles, Calif., for the Wood Roadmixer, a complete traveling mixing plant, as follows:

Parker-Danner Co., 25 Factory St., Hyde Park 36, Mass., for the entire states of Maine, New Hampshire, Vermont, Massachusetts, and Rhode Island;

Woodward, Wight & Co., Ltd., 451 Howard Ave., New Orleans 9, La., for the entire state of Louisiana and a portion of Mississippi;

Alban Tractor Co., Inc., 721-727 E. 25th St., Baltimore 18, Md., for the states of Maryland and Delaware, the District of Columbia, and a portion of Virginia;

Florida-Georgia Tractor Co., P. O. Box 1649, Jacksonville, Fla., for the entire state of Florida and a part of Georgia;

Hampton Roads Tractor & Equipment Co., W. 39th St. & Killem Ave. (P. O. Box 237), Norfolk, Va., for Virginia;

Southern Equipment Sales Co., P. O. Box 1341, Columbia, S.C., for the entire state of South Carolina;

North Carolina Equipment Co., 3101 Hillsboro St. (P. O. Box 431), Raleigh, N.C., for North Carolina.

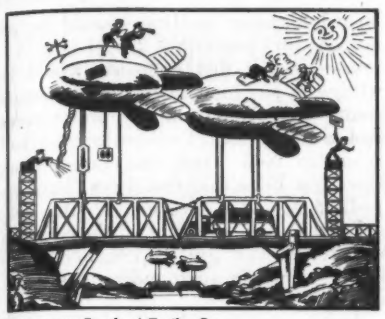
H. O. Penn Machinery Co., 140th St. & East River, New York City, for the metropolitan New York area;

W. E. Phillips Equipment Co., 7279 Artesian Ave., Detroit 10, Mich., for the state of Michigan;

Tri-State Equipment Co., 124 East Calhoun Ave., Memphis 2, Tenn., for the state of Tennessee;

State Tractor & Equipment Co., P. O. Box 3795, Phoenix, Arizona, for the Arizona territory.

2% or 135 million highway dollars will be invested in cement.
8% or 120 million highway dollars will be invested in aggregate quarrying.
Approximately 14% or 210 million highway dollars will be invested in iron and steel, rubber, explosives and other manufactures including power.
Here's How Public Construction Will Help Your Business
Highways, waterways and ground facilities for the airways should not, probably could not, be privately financed and privately operated for private profit. They are proper and fertile fields for the investment of public funds. No other postwar dollars can pay off so handsomely in millions of good jobs, in universal public benefits and in far reaching good business.
Probably the smartest and the busiest postwar dollars will be those spent for highways, roads and streets. How yours and twenty other branches of industry will benefit is shown on the chart. The studies of the U. S. Public Roads Administration, upon which it is based, also show that each dollar spent will result in business transactions totaling more than three dollars.
Every citizen has an interest in the postwar highway building and other public construction programs. Workmen and business men have a double interest worthy of extra attention.
6.4%
7.6%
7.5%
4.5%
4%
8%
9%
18%
17%
18%
INSURANCE & TAXES
RETAIL TRADE
AGGREGATE QUARRYING
CEMENT
TRANSPORTATION
PAINT & EQUIPMENT
WHOLESALE TRADE
PETROLEUM PRODUCTS
MANUFACTURING
METALLIC ORE MINING
COAL & COKE
POWER
AGRICULTURE
EXPLOSIVES
FORESTRY
RUBBER
LABORATORY
METALS MFG.
Union Wire Rope Corporation is devoting current advertising funds to furtherance of soundly planned public construction programs because of their historic ability to function as economic stabilizers such as will be needed at war's end.
Approximately 12% or 180 million highway dollars will be invested in petroleum, metals, coal and other products of the mines, forests and farms.
14% or 210 million highway dollars will be invested with wholesalers and retailers—6% or 120 million will pay taxes, buy insurance, advertising and laboratory development.



Courtesy, Fruehauf Trailer Co.
The answer to the weak-bridge problem.

Testers for Motors Are Now Available

Announcement has been made by the Electric Heat Control Co., 9123 Inman Ave., Cleveland 5, Ohio, that its line of King motor testers Type MT-695 is now available in any quantity without priority. These universal motor analyzers are designed for testing coils, ignition, condensers, spark plugs, cam angle, generator, voltage regulators, vacuum fuel pumps, resistance, bulbs, continuity, ground and insulation.

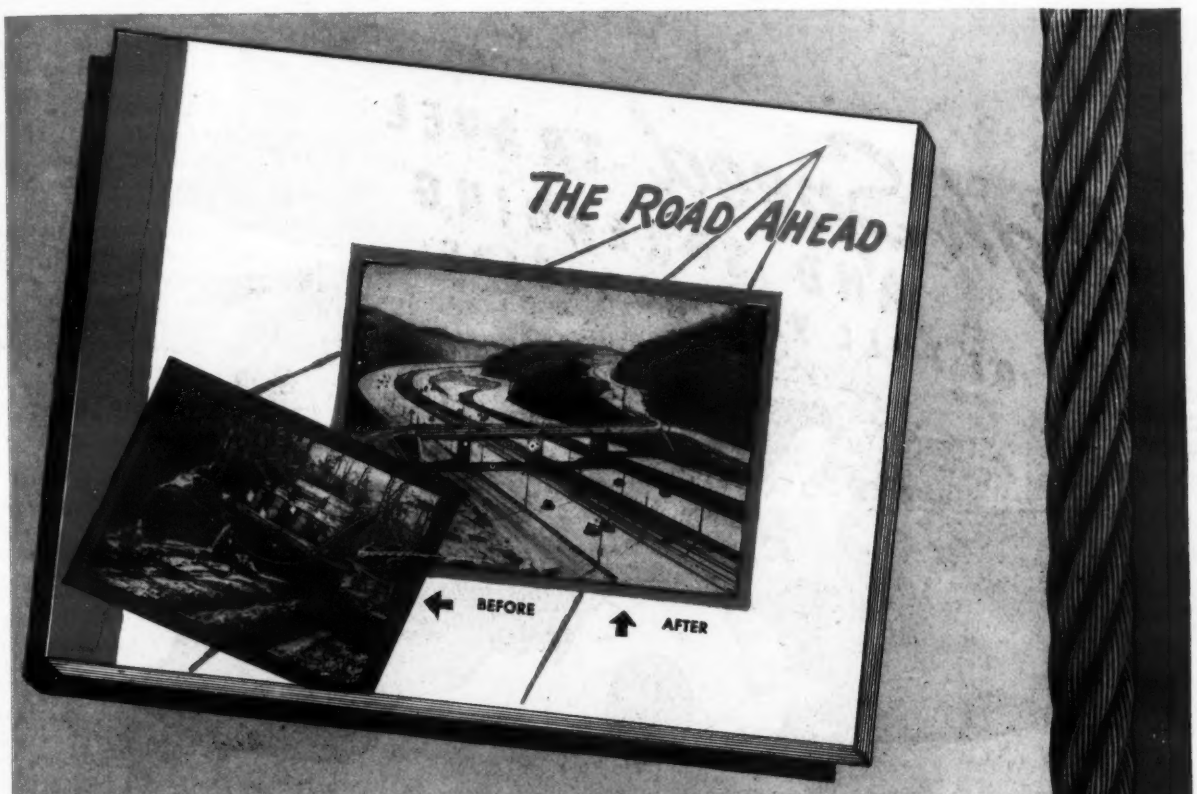
Made for operation only on 110-volt 60-cycle current, the King motor tester comes in a modernistic cabinet 57 inches high, 29 inches wide, and 22 inches deep, and is shipped complete with all necessary test leads, adaptors, and operating manual. It will test both 6 and 12-volt systems.

Among its exclusive features is a high-tension meter for a coil-ignition test, which shows the actual amount of current going from the coil to spark plugs and any losses, whether due to bad distributor, breaker points, leaky cables, defective condenser, or weak coil. Another King development is the condenser tester, built on the oscillator principle and employing a standard radio tube. In addition to testing automotive condensers for leakage, capacity, opens and shorts, it will also detect series resistance of very low values. Another feature, on which patents have been granted, is the spark-plug tester which will measure any resistance due to poor welds of the electrodes and also detect losses of current due to carbonized porcelains. Both the condenser and spark-plug testers operate on alternating current only.

A folder containing further details on the variety of motor tests which may be made with the King Type MT-695 motor tester is yours for the asking. Just send your request to the manufacturer and mention this magazine.

Hercules Official Dies

Thomas W. Bacchus, retired Vice President and Director of the Hercules Powder Co., Wilmington, Del., died recently at the age of 82. Mr. Bacchus, long recognized as the dean of the explosives industry, joined the original Hercules Powder Co. in 1893, later became associated with E. I. du Pont de Nemours & Co., and resigned in 1912 to become Vice President and General Manager of the present Hercules Powder Co. He retired in 1941.



Is Your State or City Prepared To Gain Modern Highways, Roads and Streets BY MATCHING DOLLARS?

Both Houses of Congress have approved, and the President has signed, bills calling for 1½ billion dollars to construct postwar highways, roads and streets. Although bigger than any highway appropriation of the past, this is modest in comparison with the need as shown by studies of the U. S. Public Roads Administration, State and County highway officials and American Road Builders' Assn.

In order to utilize Federal highway funds, each state or municipality must be prepared with its own matching funds. In many states revenue from highway levies have been inadequate. In others it has been used for other purposes. If, for any reason, your state or community is not prepared to match the Federal funds allocated, no doubt your state legislators will welcome active public support of a highway building program in the 1945 legislative session.

As an aid in organizing and offering intelligent support, may we suggest that you study carefully the book entitled "The Road Ahead". It has been impartially compiled and published by the American Road Builders' Association and is highly informative on all phases of the vital subject of highways, roads and streets. For a free copy send the coupon below to either of the addresses given.

UNION WIRE ROPE CORPORATION
8192 Manchester Ave., Kansas City 3, Missouri
Send a Free copy of book entitled "The Road Ahead"

AMERICAN ROAD BUILDERS' ASSOCIATION
Mr. Charles M. Upham, Engineer-Director, 1319 F St. N.W., Washington, D.C.

NAME _____

FIRM _____

ADDRESS _____ CITY _____ ZONE _____ STATE _____

Engineer Operations In Present Conflict

Services of Corps of Engineers Are Outlined and Compared to Job Done In 1917-18; Scope of Work Expanded

(*Photos on page 4*)

✦ THE percentage of U. S. Army Corps of Engineers forces to the total force in this war is just about the same as it was during the last war, Major General C. R. Moore recently told SHAEF correspondents in the European Theater of Operations, but pointed out that the amount of work to be done has increased almost astronomically. In 1917-18, there was no work of port rehabilitation to be done, no operation of open beaches, no mines to be lifted, very few booby traps, and hardly any airfields to be built.

Contrast that with the fighting potentials of today, General Moore said, and we find that, although the size of an Infantry Division is considerably smaller, it now has more than twice the fire power and more than three times as many vehicles per 100 men as did those in the previous war. The burden of providing adequate road, rail, and port facilities is emphasized by the present-day requirement in excess of 1,000 tons per day to supply each front-line division and its supporting troops. The difference in requirements for gasoline, oil and lubricants is scarcely comparable, since all the gasoline consumed by General Pershing's AEF during the entire campaign would scarcely be considered a fair operational reserve for our Armies in the field and our Air Forces.

Use of Modern Equipment

Substantial progress in Engineer capabilities has been made by the use of modern equipment. A big bulldozer can move more earth than several hundred men, and one 8-yard dirt-moving scraper can do as much cut and fill as 500 men with picks and shovels, General Moore said. The portable steel airfield landing mat makes it possible to put down a good forward airfield in two or three days, if the grading is not excessive, and a half dozen men with a motorized air compressor can do as much as a whole company of men could do with hand tools.

The military pipe line is another new development, enabling the delivery of bulk gasoline in forward areas regularly and without cluttering up the roads with tank trucks. It is estimated that each pipe line put in removes 400 trucks a day from the roads, thus clearing the way for other cargo needed up front. The pipe line itself is economical of tonnage, even when it is being built, and more than 50 miles of line has been laid in a single day.

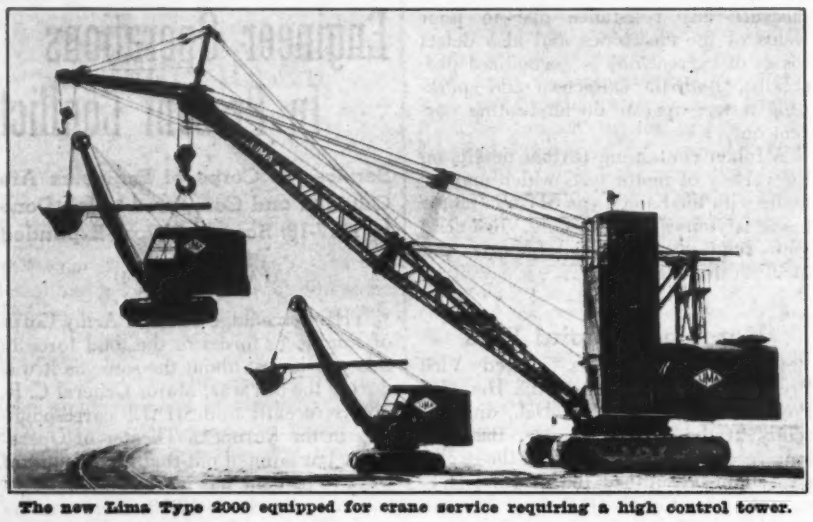
Types of Work Being Done

At the present time in the European Theater, there are about fifty different kinds of Engineer troop units serving in every component of the Army Air Forces, the Field Forces, and the Service Forces in the Communications Zone.

Engineers with the Air Forces build, maintain and defend airfields, furnish fire protection, and reproduce maps and charts for all installations. In the Ninth Air Force, the Engineer Command is one of the largest components and operates as a unit in the same way as the Bomber Command, Fighter Command, and Air Service Command.

In the Field Forces, each Infantry and Armored Division has a Combat Engineer Battalion which is used as a single unit or is split up so as to attach one company to each regimental combat team. During the assault on the beaches, an extra Engineer Combat Battalion was assigned to each assault division area. Divisional Combat Engineers handle

(*Concluded on page 71*)



The new Lima Type 2000 equipped for crane service requiring a high control tower.

New 5-Yard Machine Digs With Air Control

A new crane-shovel-dragline which has a 100-ton lifting capacity as a crane and a 5-yard capacity as a shovel or dragline has been announced by the Shovel and Crane Division, Lima Locomotive Works, Inc., Lima, Ohio. This Type 2000 machine has the drums in tandem and is equipped with air control which simulates the smooth, quick and positive movement of steam power.

The long wide crawlers give low bearing pressure on the ground and maximum stability when traveling over wet or uneven terrain. The Type 2000 is powered with either a diesel engine or electric motor and can be converted in the field from one to the other without major dismantling. This new machine extends the Lima line of shovels, cranes, and draglines from ¾ cubic yard to 5 cubic yards. This machine, as well as the balance of the Lima line, will be available as soon as Government requirements are fulfilled.

Complete information regarding the new dirt mover may be secured by those interested direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Three Stewart-Warner Staff Members Promoted

In conformity with its policy of advancing men within the organization to key positions, the Stewart-Warner Corp., Chicago, Ill., announces the promotion of three men long associated with the company. Arden Lefevre, who joined the organization in 1925 as a designer, has been appointed Director of Engineering of Division One (including Alemite instruments and radio), filling the vacancy left by the recent death of Fred Johnston. George W. Oehlsen, Jr., has been made Assistant Director of Engineering of the Division. He has been with Stewart-Warner since 1925, and served as Assistant Chief Engineer of the Radio Division for a number of years.

The third promotion is the appointment of Fred R. Cross as Advertising Manager. Mr. Cross has served the company almost continuously since 1924, in various capacities, including the post of Advertising Manager of the Alemite Division.

New Jersey Governor Proposes Toll Roads

In his second annual message to the New Jersey State Legislature, Gov. Walter E. Edge suggested the post-war construction of parkways or scenic highways in New Jersey on which moderate tolls would be charged. He stated that it was obvious that additional or enlarged highway facilities would be required for peacetime travel and expressed belief that motorists would be willing to pay moderate tolls for special routes free from ordinary obstructions and truck traffic. Commenting on toll roads in New York and Connecticut, Governor Edge said that these "have expedited so-called pleasure driving, taking much of the pressure off the commercial roads, and greatly enhanced real-estate values in surrounding communities."

In his message, the Governor urged the Legislature to grant the necessary authority for building such toll roads as would pay their own way. He declared that as soon as funds, labor and material were available work could be started on 616 miles of new roads already approved by the Legislature at an estimated cost of $300,000,000. Not all of these, it is understood, are in the toll-road classification. Other highway projects, if approved, would provide a back-log of $520,000,000 of work in the post-war period.

Shunk
Superior Quality
BLADES
AND CUTTING EDGES

For any make of machine
Motor Graders, Maintainers, Scrapers, Dozers, Bulldozers, Backfillers, Wagon Scrapers, Trail Builders, Trail Blazers, Carryalls. Also—

CUTTING EDGES
WEARING BOOTS
BACK SLOPERS
EXTENSION BLADES
MOLDBOARDS
and
SCARIFIER TEETH

50 years of manufacturing blades has developed for you a special steel, milled through our own rolls and forged at the edges to give that extra wearing quality you need.

All widths lengths, and thicknesses, PUNCHED READY to fit YOUR machine.

Consult your internationally recognized Blade Specialists. Write for special bulletins, giving type and name of machines you operate—get set for Blades early.

Shunk
MANUFACTURING COMPANY
Established 1854
BUCYRUS, OHIO.

Powerful Air-Operated Cable Hoist

Smooth operation at touch of a finger avoids "jerky" starts and stops. Takes up or releases to exact position desired. Saves cable wear and down time for repair.

● You never have to slacken speed with a Wooldridge Terra-Cobra while traveling, spreading or turning due to positive two-wheel hydraulic steering. Both wheels are controlled by a single steering bar. There are no steering clutches to fight nor individual brakes to grab—no danger of "jacknifing." The front drive wheels are under full traction and power at all times even on turns—and they maintain a fixed direction of travel over soft, rough, rocky or uneven ground. Rapid acceleration and surplus rim pull insures high average speeds and greater yardages at a lower cost. Get the full details on high speed earthmoving.

WRITE TODAY FOR NEW TERRA-COBRA BULLETIN

WOOLDRIDGE MANUFACTURING CO.
SUNNYVALE, CALIFORNIA

WOOLDRIDGE TERRA-COBRA
SELF-PROPELLED EARTHMOVERS

1945 Highway Outlook In State Legislation

Survey Shows Action Anticipated On Funds for Post-War Construction, Constitutional Protection of Road Money, Gas, and Vehicle Taxes

✦ A STUDY of pre-session reports from forty-four states whose legislatures will meet in 1945 shows that the major subjects on which there will be legislation include fiscal arrangements for post-war highway rehabilitation and development, constitutional dedication of state highway funds to highway purposes, possibilities of gasoline and other motor-vehicle-tax increases, broader motor-vehicle reciprocity, and more liberal state size and weight regulations for motor vehicles. The effect of many of these proposals would be to make permanent much wartime liberalization of restrictive motor-vehicle statutes. Only four states, Kentucky, Louisiana, Mississippi, and Virginia, have no regular legislative sessions this year.

Highway Funds

Plans for renewed highway development during the biennium covered by most sessions are expected to revolve around the $1,500,000,000 Federal-Aid program recently approved by Congress for the first three post-war years, although some states report road programs of much longer duration. State highway fund surpluses total approximately $450,000,000, outside of debt obligations, with the greatest accumulations in Pennsylvania, California, Texas, North Carolina, and Virginia.

Anti-Diversion Legislation

Legislation to give to voters the opportunity of amending their state constitutions to protect highway funds against diversion is proposed in eighteen states: Alabama, Arkansas, Connecticut, Georgia, Illinois, Indiana, Maryland, Massachusetts, New Mexico, New York, Oklahoma, Pennsylvania, Rhode Island, Tennessee, Texas, Utah, Wisconsin, and Wyoming. In some of these states, as well as others, statutory protection of highway funds is being urged as second choice, and the need for money to match Federal-Aid highway funds is expected to be an additional argument against diversion.

Diversion itself is expected to be a major issue in eight states: Arkansas, Delaware, Illinois, New Jersey, New York, Ohio, Oklahoma, and Rhode Island.

Increases in Highway-User Taxes

Increases in gasoline tax rates are expected in nineteen states: California, Colorado, Connecticut, Illinois, Iowa, Kansas, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Mexico, Ohio, Pennsylvania, Texas, Utah, West Virginia, and Wisconsin. Reports of other possible motor-vehicle tax increases come from fifteen states: Arkansas, Colorado, Connecticut, Idaho, Illinois, Iowa, Kansas, Michigan, Missouri, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, and Texas.

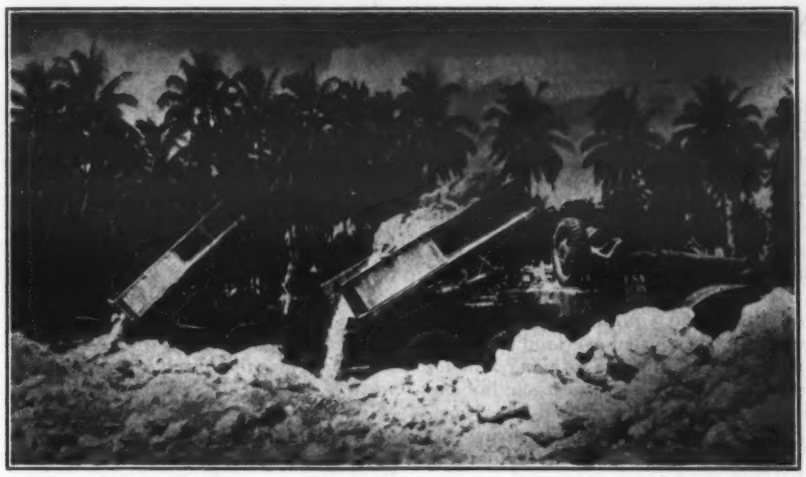
Efforts to increase the proportion of state motor-vehicle taxes allocated to counties and municipalities for use on their highways and streets are reported from several states.

Legal authority for broader motor-vehicle reciprocity agreements is expected to be sought in seventeen states: Arkansas, Connecticut, Florida, Idaho, Iowa, Maine, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Mexico, North Dakota, Tennessee, Texas, Wisconsin, and Wyoming.

Liberalized Sizes and Weights

Efforts to gain more liberal motor-vehicle size and weight legislation or make permanent the temporary wartime measures are reported from twenty-four states: Arkansas, Colorado, Connecticut, Florida, Illinois, Indiana, Iowa, Maine, Massachusetts, Minnesota, Nebraska, New Mexico, North Carolina, North Dakota, Oklahoma, Oregon, South Carolina, South Dakota, Tennessee, Texas, Vermont, West Virginia, Wisconsin, and Wyoming.

Readers who are interested in detailed information from each state should apply for a copy of a report, Information Service Bulletin, December 19, 1944, prepared by the National Highway Users Conference, National Press Building, Washington 4, D. C.



Official U. S. Marine Corps Photo

The Seabees using International trucks for hauling coral rock to build a runway on an island in the Pacific.

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. . . the improved heavy-duty oil for trucks and tractors

HERE'S THE OIL that sets a new standard of performance for truck and tractor service. Gulf Dieselube H.D. is especially manufactured for lubrication of automotive type Diesel engines, and for gasoline engines operating under heavy-duty conditions.

Gulf Dieselube H.D. is a quality lubricating oil of the improved detergent type — helps keep motors clean, and rings free. It holds carbon and sludge forming materials in suspension, thus preventing harmful deposits in the crankcase and on rings and pistons. It is noncorrosive to all types of alloy bearings, including copper lead and cadmium silver.

U. S. Army Specification 2-104B for heavy-duty motor lubricating oil is met in every respect by Gulf Dieselube H.D., and large quantities of this oil are being used in practically all war theaters from the Arctic to the Tropics in all types of Army motorized ground equipment—both Diesel and gasoline engines—in trucks, busses, jeeps, tanks, tractors, ambulances and other service vehicles.

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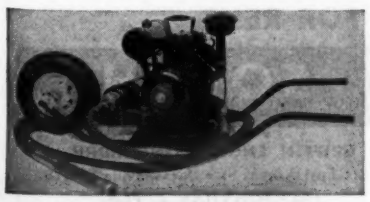

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New Line of Dredges In Variety of Types

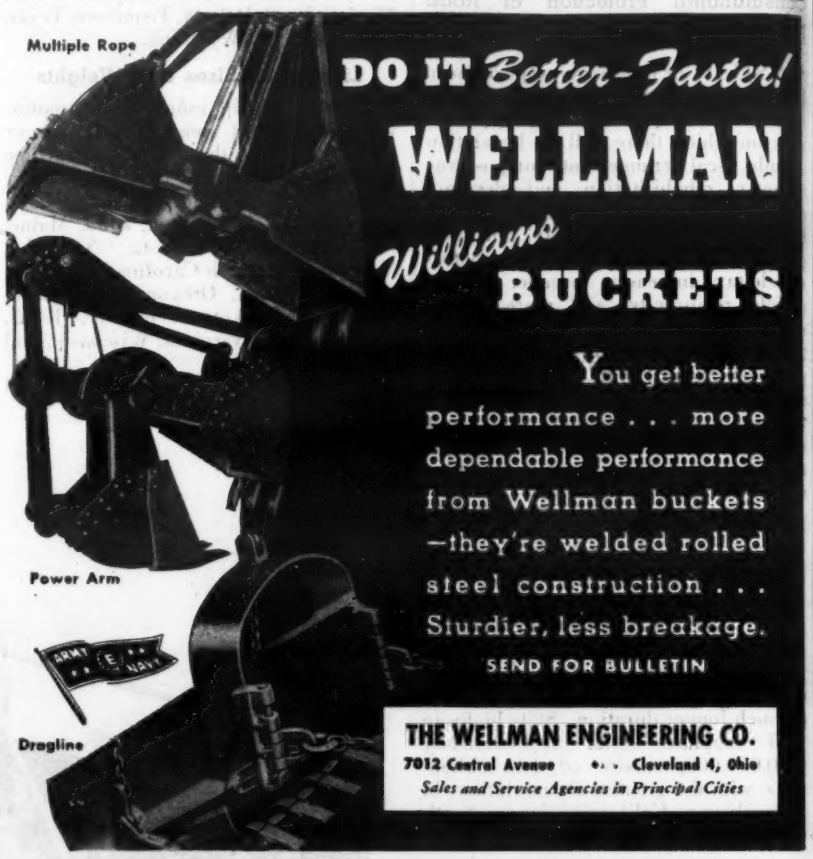
Hydraulic, dipper, and clamshell dredges of completely integrated and standardized design have passed the blueprint stage and are scheduled for production by the American Steel Dredge Co., Fort Wayne, Ind., as soon as present commitments on barges for military use will permit. All these new dredges will have bolted sectional steel hulls and are so designed that all subassemblies and equipment can be conveniently transported overland to remote locations, or shipped to foreign countries as hold cargo. The largest single component part can be handled by a portable crane. By thus standardizing the hull sections and carefully planning the distribution of the weight of the power plant and operating machinery, the manufacturer states that it is possible to effect substantial savings in production time and material costs, while in many cases increasing overall efficiency.

The line of hydraulic dredges will be available in 6, 8, 10, 12, 16, and 20-inch sizes, and will be built for diesel-electric, electric, steam, or diesel power. The general design of these units will be similar to the 12-inch units produced by the company for the armed forces. The standard dipper and clamshell dredges will have a capacity range from ¾ to 3 cubic yards and will be powered by diesel, steam, diesel-electric, or electric prime movers. The hoists will be of American Steel Dredge Co. design, and the units will be rigged for two-part or single-line operation. On some of the smaller units the booms are interchangeable, making the dredge quickly convertible from dipper to clamshell type of operation.

According to Walter W. Walb, General Manager of the American Steel Dredge Co., standardization in dredge design has never before been seriously undertaken by his company, but it is thought that the substantial economies thus effected will be of advantage to contractors and others engaged in dredging operations after the war.

Marion Steam Shovel Names New Distributors

The Marion Steam Shovel Co., Marion, Ohio, manufacturer of a line of excavating equipment, has added the following companies to its list of distributors: Tulsa Equipment Co., 317 E. Third St., Tulsa, Okla., representing the state of Oklahoma; Texas Equipment Co., Box 1734, Houston 11, Texas, for southwestern Texas; Shaw Sales & Service Co., 2027 So. Santa Fe Ave., Los Angeles, Calif., representing Marion power shovels in southern California; and Shaffer & Co., Brazil, Ind., rendering complete distributor service in southern Indiana and western Kentucky.



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You get better performance . . . more dependable performance from Wellman buckets —they're welded rolled steel construction . . . Sturdier, less breakage.

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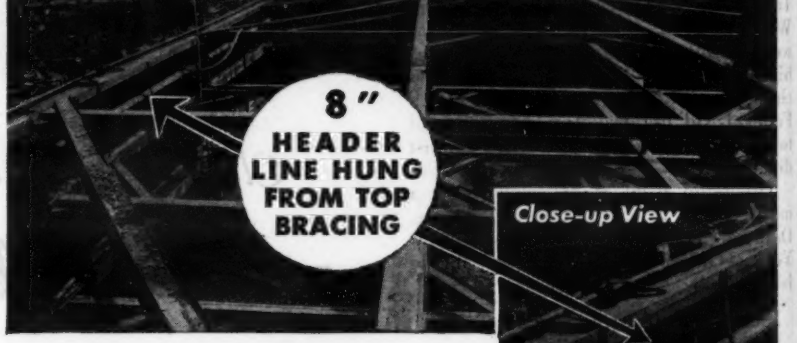
THE CARVER PUMP CO. Muscatine, Iowa

CARVER CENTRIFUGAL *Certified* PUMPS

A Griffin Wellpoint Job!



Capable Job Analysis

Here is a good example why it pays to deal with Griffin. The header line is out of the way under the bracing. No need to worry about the bucket smashing the system. The Griffin Wellpoint Pump is outside the cofferdam—leaving inside maximum clearance. No need for extra room for sump pits as with open pumping methods.

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U. S. Engineers Photos

Dry batching for concrete paving at the Yuma, Ariz., Army Airfield was done at a plant set up over a depressed roadway. At left, the Cedarapids bins and the cement dock; at right, a close-up of the dock showing the bottom-dump cement hoppers.

Improvements Made At Airfield in Arizona

(*Continued from page 2*)

specifications:

Passing (Square Openings)	Mix No. 1 Per Cent	Mix No. 2 Per Cent
1 inch	100	.....
¾ inch	85–100	100
½ inch	73–88	86–100
⅜ inch	.....	75–93
No. 4	46–60	55–67
No. 10	32–47	40–54
No. 40	16–26	22–31
No. 80	10–18	12–20
No. 200	4–8	4–8
Per cent of asphalt	5.0–6.0	5.0–6.0

Ordinarily eight trucks hauled the output of the hot-mix plant an average of 2 miles where it was spread on the taxiways by a 10-foot Barber-Greene bituminous finishing machine. The crew consisted of an operator, a truck dumper, three rakers, and a laborer, as well as the operator of the 10-ton Ingram tandem roller which provided the final compaction. A dust palliative treatment of MC-1 was applied for a width of 25 to 100 feet on all shoulders.

Concrete Paving

Aggregates for the concrete paving were trucked from the Trigg Sand & Gravel Co. plant west of Yuma and stockpiled in a semicircle near the 20-ton 2-compartment Cedarapids bin used for proportioning the coarse aggregate which was furnished in 1½ to ¾-inch and ¾-inch to No. 4 sizes. A second 10-ton Cedarapids bin was set on a wooden frame beside the larger bin which supported one side of it, and discharged sand from its bottom-dump gate through a chute into the weighing batchers, equipped with Winslow scales, mounted under the larger bin. The bins, which were loaded by a Lorain 40 crane with a 40-foot boom and Mead-Morrison ¾-cubic-yard clamshell bucket, were set in a deep trench with their tops only 12 feet above the natural ground level which materially aided the crane operator to maintain the required production rate.

Adjacent to the bins and only slightly above the scale-operator's platform, a wooden structure was erected, also straddling the truck runway, which furnished storage for a car of Monolith cement in cloth sacks. The surface of this platform was level with the floor of the cement cars spotted on the siding whose other end provided space for asphalt tank cars opposite the hot-mix plant. A crew of eight men with 2-wheel Thomas hand trucks handled the cement from the car to the platform or batching hoppers and loaded seven bags of cement per batch into each of the two metal-lined bottom-dump hoppers, set in the center of the storage platform directly over the truck runway.

The composition of a concrete batch was as follows:

Cement (7 bags)	658 lbs.
Sand	980 lbs.
Gravel, No. 4 (¾-inch)	980 lbs.
Gravel, ¾ to 1½-inch	1,330 lbs.
Water-cement ratio (gallons per bag)	5.2

Because of the short runs of paving for the warm-up and turning pads, and the necessity for coordinating operations for the convenience of the Air Forces, no production records could be obtained. General shaping of the fine grade to a crown of 0.75 foot in the 150-foot width, with irregular warping to meet the existing runway grades, was performed as part of the base compacting operations but the extra depth necessary for setting the thickened-edge forms was cut by a Carr Formgrader. Blaw-Knox, Standard Steel Corp., and Metaform steel forms with a 9-inch face were used. Strips of 1 x 2-inch lumber were fastened to the faces of some of the forms by two nails driven through holes drilled in them, to form the necessary keyed joints between the adjacent 12.5-foot lanes, and 4 x 10-inch lumber was bolted to the bottom of other forms used for the thick edge of the 13-9-13-inch section. A total of 10,000 feet of forms was set before paving operations were commenced, and transferred and reset as needed. A rather unusual pin puller consisting of a block of 1-inch steel, its center cut out in a form approximating a figure 8, and attached to a lever made

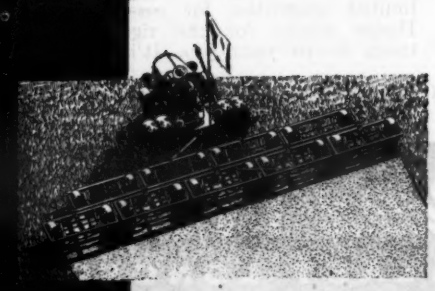
(*Concluded on next page*)

WORTHINGTON MOWING AND MAINTENANCE EQUIPMENT FOR THE HIGHWAYS OF TOMORROW

Our war job — producing thousands of high-speed mowing units for the Air Forces of the United Nations — is almost finished. Today Worthington's famous airfield "Grass Blitzer" is keeping airfields in "fighting trim" from Italy to India...from America to Australia. Over 10,000 Worthington cutting units have been manufactured...and that's enough to cut over 50,000 acres an hour!

Now **your** problems of keeping tomorrow's highway shoulders in the best condition is uppermost in our post-war plans. We have no reconversion problem. We are looking forward with anticipation to serving you as soon as we are authorized to produce for other than military use. You will find Worthington mowing and maintenance equipment **better than ever...** with the experience of our war production added to our thirty years' background of producing the best machinery for keeping all types of turf in tip-top condition. If you have a mowing problem write us and we will gladly help you to solve it.

The Army-Navy "E" pennant (with star) flies over our plant as a tribute from the armed forces to our employees, our suppliers and our customers — without whose whole-hearted cooperation our all-out wartime production would not be possible.



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Mfrs. of Sterling Transits & Levels

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Arizona Airfield

(*Continued from preceding page*)

from an old truck axle, was used. Premolded joints were set ahead at 90-foot intervals in the lane being poured, with 1-inch dowels, having a sleeve over one end, extending through them.

Seven 3-batch trucks delivered the batches to the Rex 27-E paver where one man dumped them into the skip of the paver which was operated in the lane adjacent to the one being poured. Alternate lanes, extending the lengths of two or three pads, were paved between pours of the intermediate lanes, so that average production was only 250 to 300 cubic yards per shift because of the short runs and frequent moves. For moving the heavy finishing machine, a sled was provided, built of 6-inch I-beams as runners with 4-inch I-beams welded at right angles to form a track for the finisher and the whole frame cross-braced by 2-inch welded steel angles. A Wisconsin-powered Sterling pump, mounted on an old truck chassis with an 800-gallon storage tank, provided water for the paver. The supply was replenished from the Post water system by the same tank trucks used to haul water for subgrade and base stabilization.

Three puddlers shoveled the concrete to the Jaeger-Lakewood finishing machine equipped with a tamper and double screeds, and one man, working from a rolling bridge, placed the dummy joints at 15-foot intervals. The final broomed finish was produced by four hand finishers who also attended to the straight-edging and finished the joints. Hunt Process curing compound was sprayed on the finished surface of the concrete.

Major Quantities

The major items of this contract included the following:

Excavation	55,000 cu. yds.
Imported borrow	14,000 cu. yds.
Gravel base course	19,500 cu. yds.
Paving asphalt (85 to 100-penetration)	614 tons
Central plant hot-mix (bituminous)	12,287 tons
PCC pavement (13-9-13)	43,150 sq. yds.
Membrane curing solution	1,987 gals.
MC-1 applied	178 tons

Personnel

The contract for hot-mix paving for taxiways and transitions and portland-cement concrete paving of warm-up and turning pads at the Army Airfield at Yuma, Ariz., was awarded to the Arizona Sand & Rock Co., Phoenix, Ariz., on March 21, 1944, by the Los Angeles District, U. S. Engineers, on a low bid of $207,687.85. A later supplemental agreement provided for 24,900 squares of load testing. Superintendent John Ryan started operations on March 23 and completed them on August 15, 1944.

For the U. S. Engineers, the work was under the direction of the Los Angeles District Engineer, with Captain Richard A. Floyd, C. E., Resident Engineer, assisted by John H. Bartlett, Chief Inspector. Following Captain Floyd's transfer on July 10, 1944, the work was completed under the supervision of Mr. Bartlett as Resident Engineer.

Loose tire chains give better traction and longer tire life than chains which are fastened tightly.

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This Dodge has delivered 430,700 miles... it's still giving dependable service!

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Do you want that kind of hauling equipment? Then see your Dodge dealer—now—about trucks to fit *your* job . . . trucks to give you more dependable, longer-lasting, MORE ECONOMICAL transportation.

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FIT THE JOB...LAST LONGER

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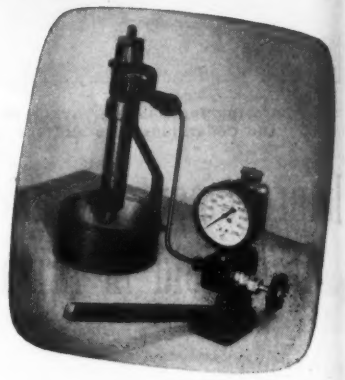

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The new Alemite Versatal pump for dispensing and applying paint and similar materials.

New Paint-Spraying Unit Is Now Available

For the first time, complete details on the Alemite Versatal material spraying pump, used by the U. S. Navy for applying a secret anti-fouling paint on ship bottoms, have been released by the Industrial Alemite Division of Stewart-Warner Corp., 1826 Diversey Parkway, Chicago, Ill. More than five hundred of these pumps are now in operation in this country and abroad. Until recently a rigidly controlled item, these pumps are now available for civilian operations.

Versatal pumps are designed to dispense and apply a wide variety of materials, including paint, lacquer, mastic, sealers, insulating materials, fibre and cement coatings, and caulking compounds. They operate on air power and from one to six operators may work simultaneously, using as many different spray heads and material lines from a single pump.

The material is delivered from the pump at pressures 4½ to 5½ times the air pressure introduced to the pump. It supplies material through several hundred feet of hose, thus making it possible to reach places heretofore difficult for spraying operations. There is no air head in the material container, and the container can be reloaded while operations continue uninterrupted. This new Alemite development has an automatic agitator which maintains an even material mixture without the aid of mechanical devices. Operations on which these pumps have been used include spraying fibre coating on oil-storage tanks and pipe lines to prevent corrosive action, spraying asphalt varnish and red lead on tanks of railway cars, spraying anti-rust paint on bridges and structural steel, painting barrels, and spray-painting on buildings.

Versatal pumps are now available in several types and sizes. Model 7804-C, a stationary barrel pump, is designed to fit over the top of any standard 54-gallon barrel and is recommended for the handling of heavy or viscous materials. Model 7805-C, also a stationary barrel pump, is especially designed to handle fluid-type materials. There are also portable pump models which come complete with an attached 12-gallon material container.

A complete catalog of Versatal pump types, spray heads and guns, accessories, and Alemite outfits is now ready for distribution to those who write direct to the manufacturer and mention this news item.

Stabilizing Road Bases With Asphalt Emulsion

A 4-page folder which describes and illustrates a low-cost method of road building has been made available by Bitucote Products Co., 1411 Central Industrial Drive, St. Louis, Mo. Details of six simple steps in producing a finished stabilized base course with Bitucote emulsified asphalt will prove helpful to state and county highway engineers who are looking forward to extending their road funds as far as possible in the post-war rehabilitation of their highways.

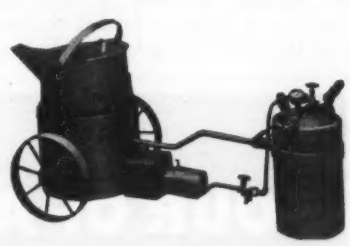
Copies of this folder, "Lower Road Building Costs With Bitucote", will be sent promptly to those writing direct to the producer and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

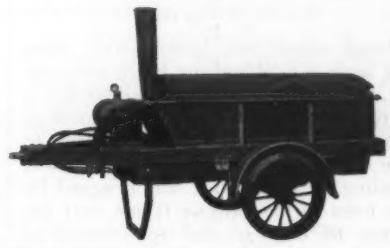
Thew Appoints New Official To Direct Post-War Work

Waid V. Clark has been appointed to the post of Controller by the Thew Shovel Co., Lorain, Ohio, manufacturer of excavating equipment. This newly created office has been established in anticipation of increased post-war work which will come under the supervision of the Controller. Prior to this appointment, Mr. Clark was Assistant to the President of the Glenn L. Martin Co., Baltimore, Md., for two and a half years, and before that was connected with the Cleveland Railway Co., and the Union Trust Co. of Cleveland.

For Speedy heating of tar and asphalt—

Use this CONNERY oil-burning Patrol Patching Heater on the *small* job and this CONNERY oil-burning kettle for *large-quantity* production.





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Your equipment NEEDS for post-war construction must meet changed conditions! New structural designs, new materials, plus the greatest BACKLOG of building demand in the history of the U. S. A. . . . that's what YOU MEN in the construction industry FACE!
CMC equipment is ready to help you meet these new conditions!
Your old standby CMC Mixers, Pumps, Plaster and Mortar Mixers, Batchers, Hoists, Carts and Barrows improved and up-to-the-minute in every feature you need. In addition, there's the new CMC Radial Saw . . . a marvel of speed and efficiency. The new CMC Concrete Gun is something to "write home about" when it comes to fast construction. And the CMC Electric Generating Plants to take the "juice" for power and light right to the job.
That's why we say, CMC is the equipment line that tops them all!
CONSTRUCTION MACHINERY CO.
WATERLOO, IOWA

Unusual Equipment On Sealing Contract

(*Continued from page* 1)

through which two ½-inch wire ropes ran from a double-drum hoist, mounted on a GMC truck and powered by a Fordson engine, to two slip scrapers in the car. A scraper was pulled back to one end of the car by a laborer. Then, loading on the way, it was dragged by the hoist to the gallows frame near the center of the car and up a ramp of gravel to a chute hung on the side of the car which discharged the gravel by gravity into a truck alongside. The hoist operator, with three laborers, one on each scraper and one on the truck being loaded, constituted the crew which could unload a 50-ton car in approximately 2 hours when a sufficient number of trucks were available for hauling.

Truck haul was kept to economical limits by careful selection of shipping points, and stockpiles were established on the right-of-way, at approximately 1-mile intervals.

Hauling and Applying Asphalt

OA-160/190 asphalt was shipped from the Baytown, Texas, plant of the Humble Oil Co., to various sidings convenient to the work, so selected that asphalt hauls varied from 5 to 14 miles. Two Grace tank-car heaters were placed as needed to heat incoming cars, which required from 8 to 16 hours per car, and to transfer the asphalt from the cars to two 2,600-gallon trailer booster tanks pulled by Chevrolet trucks. Asphalt was loaded and applied at temperatures of from 335 to 350 degrees and an average of 17 minutes was consumed in loading the booster tanks.

At the road the asphalt was transferred into an 870-gallon Etnyre distributor mounted on an International truck and applied through a 22-foot spray bar on which the end nozzles were plugged when shooting lesser road widths. Two flagmen routed the traffic over the shoulders at the actual scene of operations. At the start of the asphalt application, a strip of Scutan paper 3 feet wide was spread across the road at the end of the previously applied asphalt, and discharge from the distributor was commenced while the spray bar was over this paper to insure a uniform application of the specified 0.3 gallon per square yard.

A Chevrolet flat-bed truck carried the paper, some gravel with which to weight it down in the desired position, a keg of drinking water, and two 55-gallon drums of gasoline for refueling the equipment. The driver of this truck placed the paper at the beginning of each shot of asphalt.

As soon as the distributor had completed the full width of road for 1,350 to 1,375 feet, the cover chips were applied.

Applying Cover Coat

At the stockpiles of cover material placed at 1-mile intervals, the contractor used an unusual loading device consisting of a 20-inch conveyor 20 feet long, mounted with a double-drum hoist on an old truck frame which was pulled by a GMC truck. A pipe boom about 15 feet long was mounted on the frame and by means of a sheave on its end the hoist operator handled a light slip scraper as a dragline bucket to move gravel from the stockpile into the loading hopper of the conveyor which discharged it into a truck driven under its upper end. An engine taken from an International tractor powered this loading device. With it, the operator, with three laborers to keep the stockpile cleaned up, handled 60 to 75 cubic yards per hour.

Hauled to the point of use in six Ford and Chevrolet trucks, the gravel was applied by a 12-foot Buckeye spreader box blocked off for a half-width application to either an 18 or 20-foot road. The spreader box was pushed ahead of a backing truck so that no tires touched the bare asphalt before it had received its gravel cover.

(*Concluded on next page*)

Here is a power unit made up of four General Motors Series 71 6-cylinder Diesel engines driving a single shaft. The unit may be operated on one or more of the engines, as required.

It's called the "Quad," and two of them power each of the famous LCI landing boats. Quads save space and weight so more troops, equipment and fuel can be carried.

Half a "Quad"—two 6-71 engines mounted side by side—is a "twin," and these power Army tanks and tank destroyers.

Here is economical power for many postwar uses—power at less than 15 pounds per horsepower—power for applications where space and weight are at a premium.

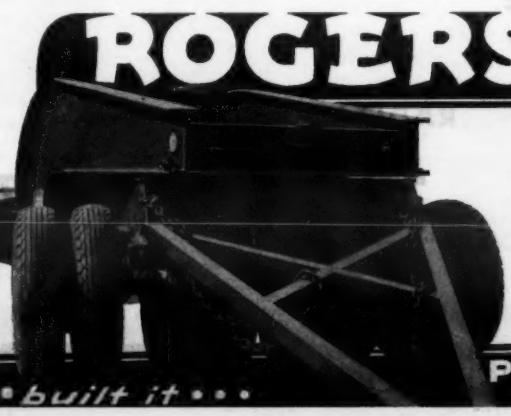
All kinds of construction jobs lie ahead. And the answer to the dependable, low-cost power that will be needed is GM Diesel engines. These dependable, easy-on-the-fuel engines have proved themselves both in war and peace in all kinds of construction equipment.

KEEP AMERICA STRONG
BUY MORE WAR BONDS

GM GENERAL MOTORS DIESEL POWER

ENGINES . . . 13 to 250 H. P. . . DETROIT DIESEL ENGINE DIVISION, Detroit 28, Mich.
ENGINES . . . 150 to 2000 H. P. . . CLEVELAND DIESEL ENGINE DIVISION, Cleveland 11, Ohio
LOCOMOTIVES . . . . . ELECTRO-MOTIVE DIVISION, La Grange, Ill.

Viewed from ANY ANGLE



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Walk around it. View it from every angle. You'll likely find yourself admiring what is obviously outstanding design and correct construction.

Back of this, of course, is a long career of specialized activity, unequalled by any heavy duty trailer organization anywhere in the world.

ROGERS BROTHERS CORPORATION
10 & ORCHARD ST. • ALBION, PA.

EXPERIENCE • built it . . . PERFORMANCE • sold it . . .

LUMBER AND TIMBER
Available now
in large quantities from 1x2" to 16x16" including stress grades Fir, Hemlock, and Southern Pine. Deliveries at once by trucks or R.R. Cars.
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FEATHER the nests of our multiplying warbirds—or there will be no nests left to any of us. Buy Bonds. CONSERVE, stimulate, protect—all in one—buying Bonds.

C. & E. M. Photo

A machine developed for loading trucks from roadside stockpiles of cover gravel, used by C. Hunter Strain of San Angelo, Texas, on his contract for bituminous sealing in District 16 in Texas.

Unusual Equipment On Sealing Contract

(Continued from preceding page)

After spreading, the cover coat was broomed by a drag broom pulled by a Farmall tractor and compacted by two 9-wheel Grace pneumatic rollers, also pulled by Farmall tractors, and given a final rolling by a 5-ton 3-wheel Ingram roller.

By pre-stockpiling materials and the use of the job-built equipment described, the contractor was able to average sealing 5 miles of 18-foot road per working day.

Major Quantities and Personnel

The major bid quantities on this job included the following:

Asphalt OA-160/190	330,000 gals.
Seal-coat rock	11,500 cu yds.
Extra rolling	500 hours

The contract for this work was awarded by the Texas Highway Department to C. Hunter Strain, San Angelo, Texas, in April, 1943, on his low bid of $80,000. Wartime difficulties in obtaining materials caused delays so that the job was incomplete when it became necessary to shut down on December 1, 1943. Operations were resumed on March 20, 1944, and the job was finished on May 5. Roy Smith was Superintendent for the contractor. For the Texas Highway Department, of which D. C. Greer is State Highway Engineer, the work was under the supervision of G. B. Finley, District Engineer of District 16, and R. L. Faltinson, Assistant District Engineer.

Air-Entraining Cement Properties Are Tested

New testing techniques to evaluate the properties of the recently introduced air-entraining cements have been developed and carried out by the National Bureau of Standards. It has been found that concrete pavements are more resistant to scaling and to destruction by freezing and thawing and the action of salt solutions when a small percentage of air is incorporated in the concrete when made. One way in which this air-entraining property may be given to cement is by intergrinding small quantities of Vinsol resin during the manufacturing process. The properties of some of these cements, however, were such that it was impossible to test them according to existing specifications. Therefore, the Bureau has devised new tests for this purpose.

Sixty-four commercially manufactured Vinsol-resin cements were procured in order to study the water requirements of the pastes and mortars, the quantities of air entrained in the various pastes, mortars, and in concrete, and also to make a survey of strengths of the test specimens.

The neat pastes of Vinsol-resin cements were stickier than the neat pastes of the untreated cements and also had a tendency to stiffen more rapidly. The cement-sand mortars made with the Vinsol-resin cements and proportioned according to present Federal specifications were in most cases more plastic than the mortars of the untreated cements. Whereas the neat pastes of the resin cements required as much or more water than the neat pastes of the untreated cements, the cement-sand mortars usually required less water for the same workability.

Concrete made from the different cements entrained quantities of air ranging from 1 to 14 per cent. The air contents of the pastes, the 1 to 3 mortars, and the 1 to 2.75 mortars were not indicative of the air entrained in concrete. Of the various mortars and pastes tested, the 1 to 4 mortar, which had been proposed as a performance test, had the greatest range of air contents with the different cements.

Most of the Vinsol-resin cement mortars had both tensile and compressive strengths greatly in excess of specification requirements. A few of the cements, however, failed to meet the 7 and 28-day compressive-strength requirements. The cements had a wide range of strengths at three days. For example, tensile strengths were obtained for the different cements ranging from 195 to 465 pounds per square inch and compressive strengths ranging from 900 to 3,360 pounds per square inch.

Iowa Dealer Appointed By Pioneer Engineering

The Martin-Roasa Tractor & Equipment Co., Cedar Rapids, Iowa, has been named a distributor for the Pioneering Engineering Works, Minneapolis, Minn., maker of crushing and screening plants and related equipment. The territory to be covered by the new dealer includes eastern Iowa and ten counties in northeastern Missouri.

It's easier to lift, lower, push or pull the Simplex Way!

Simplex LEVER SCREW HYDRAULIC Jacks

for every construction purpose

Awarded the Gold Medal for Safety

Ask for Catalog 44

Templeton, Kenly & Co., Chicago 44, Ill.

STOODY SELF-HARDENING

Resists Power Shovel Abrasion

POWER SHOVEL BUCKETS lifting tons of abrasive material per day receive tough treatment. Even manganese steel construction can't take the wear forever. But slap a few beads of Stoody Self-Hardening on that bucket bottom—on lips, runners and teeth—and watch your wear troubles disappear! It doesn't require a lot of Stoody Self-Hardening to turn the trick—a few pounds applied as stringer beads and spaced 1½" apart give excellent protection—almost as good as solid deposits—with a 75% saving in hard metal. And on bucket teeth the stringers are *better* than solid deposits; new applications can be made on all parts as often as required.

Stoody Self-Hardening is your best bet for hard-facing *all* shovel parts because it provides maximum wear resistance with high impact values, bonds strongly with manganese steel—won't chip or spall and is easy to use. Applied electrically, deposits of ¼" bare Stoody Self-Hardening can be welded ⅜" thick in a single pass—providing a deep, solid, wear-resistant layer of hard metal with half the work and half the time normally required. And use of Stoody Self-Hardening is not restricted to bucket parts alone—it's equally successful and economical when protecting track pads, idlers, drive tumblers and track rollers.

STOODY COMPANY

1136 WEST SLAUSON AVE., WHITTIER, CALIFORNIA

Why Not Make This Trial?

Order a hundred pounds of Stoody Self-Hardening today—it costs only 50c per lb. anywhere in the U. S.—and put it to work saving hundreds of dollars in shovel downtime, replacements and repairs. We know you'll be satisfied and pleased with your discovery!

STOODY HARD-FACING ALLOYS

Retard wear . . . Save Repair

Does this happen to you?

Try This Pencil Test

To provide proof of the unusual strength of its line of Durolead pencils, the Reliance Pencil Corp. suggests that you try the following test on a sample pencil which it will be glad to send you. After sharpening the pencil, remove the needle-like feather-edge point by scribbling on a piece of paper. Hold the pencil in the normal writing position and write, increasing the pressure on the point as you do so. You will note that in spite of the application of unusual strength, the point does not snap, crack, or shatter. You will also observe that the paper is not cut or torn, and the writing is clear, smooth, and sharp.

Because of an exclusive bonding process of selected and seasoned cedar wood and patented lead, it is stated that Durolead pencils are 25 to 75 per cent stronger. They are made with specially lacquered blue metal ferrule and pre-war quality eraser.

For your sample of Durolead pencils, write direct to the Consumer Service Dept., Reliance Pencil Co., 22 So. 6th Ave., Mount Vernon, N.Y., and mention this item.

New Chain Belt Dealer

The Chain Belt Co., Milwaukee, Wis., has announced the appointment of M. D. Moody, A.C.L. Warehouse No. 2, Riverside Viaduct, Jacksonville, Fla., as distributor of Rex construction machinery in the vicinity of Jacksonville. Besides handling the complete Rex line, which includes pavers, mixers, pumps, Pumpcretes, and Moto-Mixers, Moody will carry a large stock of Rex parts. M. D. Moody, Jr., will be associated with his father in this business.

Alaska Highway Film Available for Meetings

The magnitude and the miracle of the construction of the Alaska Highway have been captured in a 16-mm Kodachrome film just released by the Tractor Division of the Allis-Chalmers Mfg. Co. Photographed by Herbert C. Lanks, the film records, in natural color, the magnificent scenery which provided the background for the U. S. Engineer troops and the personnel of the civilian contractors who battled formidable obstacles to complete the 1,600-mile route in record time.

This film, which is a sound-on-film only and cannot be run on a silent projector, is available without charge for showing at meetings of contractors and highway groups. When requesting a print, be sure to give the date wanted, as only a limited number of films are available and must be carefully scheduled for efficient handling. Requests for this film "Highway to Alaska" should be addressed direct to the Tractor Division, Allis-Chalmers Mfg. Co., Milwaukee 1, Wis., and should mention this magazine.

BIG SQUEEZE COMING UP

Cracking, breaking down under pressure of heavy war trucking . . . neglected unavoidably because of manpower shortages . . . America's roads are crying for immediate attention. Meanwhile, the need for completing postwar highway plans to meet the demands of a new era of transportation is becoming increasingly imperative.

Result: There is a big squeeze coming up. To be ready, maintenance and postwar planning must both go forward at the same time! It's none too soon to consider your part in this situation.

That is why we suggest that you call in the Tarvia field man. He can offer you the benefit of Barrett's 40 years of successful experience in road construction, maintenance and repair. He can show you how to use Tarvia with local materials, to get the most miles of smooth, non-skid, long lasting pavement for the money available.

He can help you solve your postwar highway problems—now.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.

New York . . Chicago . . Birmingham . . St. Louis . . Detroit . . Philadelphia . . Boston
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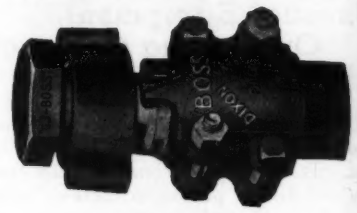
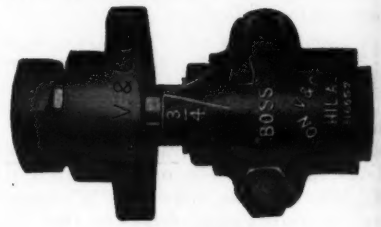
DIXON Couplings ...for Every Road Construction Job!



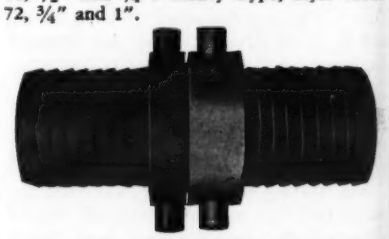
"G J-BOSS"
GROUND JOINT STYLE X-34
FEMALE HOSE COUPLING

For high or low pressure steam, air and liquid hose. Washerless, leakproof construction. "BOSS" Offset Interlocking Clamp anchors coupling to hose with powerful full-circumference grip, without pinching. Sizes: ½" to 4", inclusive.



"G J-BOSS"
GROUND JOINT
AIR HAMMER COUPLING

Strong, washerless, leakproof. No washers to replace—no danger of blow-offs. Furnished with tight-gripping "BOSS" Interlocking Clamp. Compact Type, Style XLB-61, ½" and ¾". Heavy Type, Style XHB-72, ¾" and 1".



"KING" SHANK COUPLINGS

For suction and water hose. Made all malleable iron; malleable iron, brass nut; or all brass. Uniform in quality, threading and dimensions. Shanks have deep clean corrugations. Sizes: 1¼" to 8", inclusive.

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DIXON
VALVE & COUPLING CO.
Main Office and Factory: PHILADELPHIA, PA.
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Locomotives

4 Plymouth, 3-ton locomotives, 36" gauge; type 2, Model AL. Good condition. Attractive price.

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machinery, pumps, air compressors, motors, tanks and many other items. Inquiries Invited.

Sonken-Galamba Corp.
Kansas City 18, Kans.

War's Delay of Dam Holds Up County Roads

Ellsworth County, Kans., Will Build New Road System When Federal Government Resumes Kanopolis Dam Operations

By H. A. ROWLAND, County Engineer, Ellsworth County, Kansas

✦ ALTHOUGH the war halted construction operations on Kanopolis Dam, a project to control the flood waters of Smokey Hill River in the southeastern part of Ellsworth County, Kansas, county highway officials have used the intervening time to plan a new road system which will be laid out in the neighborhood of the reservoir as soon as work is resumed on the dam. The earth-fill structure, now over two-thirds completed, will eventually be 3 miles long, with a crest 100 feet above the bed of the river. A total of 13,000,000 cubic yards of earth has already been placed, with about 6,000,000 yards yet to be moved to the big dike, the upstream face of which will be covered with stone riprap.

When the dam is completed, the newly formed reservoir will cover many existing county roads, with resultant dead-ends at several others. Consequently a number of changes, entailing considerable grading, will have to be made to relocate those roads affected by the impounded waters. Negotiations to secure funds for this road program are expected to get under way shortly with the Federal government which is also financing the flood-control project. Above the dam site, the government has acquired many acres of river bottom land which can still be farmed until the dam is completed.

Organization

Ellsworth County, where this work is located, lies in central Kansas and has a population of 9,708 distributed over 720 square miles. Although the county is primarily agricultural, native wild grasses growing in the hilly sections furnish good pasturage for thousands of cattle. Other natural resources include two large salt mines which have been operating successfully for many years, and a large number of producing oil wells in the southwestern part of the county.

The County Highway Department is under the jurisdiction of a three-man Board of Commissioners who are elected for a term of four years. Board elections are held every other year with one member being chosen at one election and two members chosen at the next election, so that an entire new board is not elected at one time. The present board consists of Bert Harmon, W. E. Woods, and Bert J. Stratmann, who are members of the Kansas County Commissioners Association. In July, 1942, they appointed the author to the post of County Engineer. He is a member of the Kansas County Engineers Association.

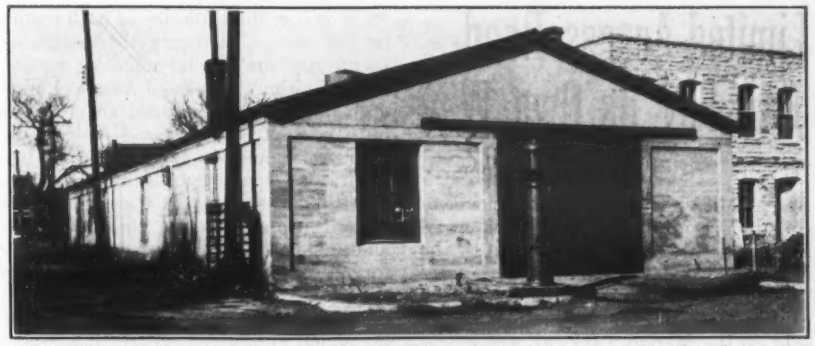
The Ellsworth County road system has a total of 204 miles, of which 163 miles are gravel or sand-surfaced, and the remaining 41 miles are graded dirt roads. In addition, there are 777 miles of township roads which are mostly dirt construction. Of the 70 miles of concrete paving which the State has laid in the county, about half this mileage is found in the important east-west route U. S. 40S.

Labor Shortage

Nearby war plants offering lucrative salaries have lured all the mechanics save one from the county maintenance forces. The lone remaining mechanic, who is also shop foreman, maintains the county highway equipment in the central garage and shop located in the town of Ellsworth. This equipment is now old and pretty well worn, so keeping it in shape is a real problem.

The garage and shop has the usual standard equipment including a forge, air compressor, overhead chain hoists, bench vises, jacks, and a Marquette electric welder. Here the county trucks are lubricated, repaired and stored. They consist of five 1½-ton pick-ups, two Fords, two Chevrolets and one International; and four small ½-ton trucks, three Fords and one Chevrolet.

The maintenance force for road repairs is composed of fifteen men who have the following equipment at their disposal: a 2½-cubic-foot concrete mixer; a Wentz snow plow; a Baker rooter; a high-speed mower; an Adams

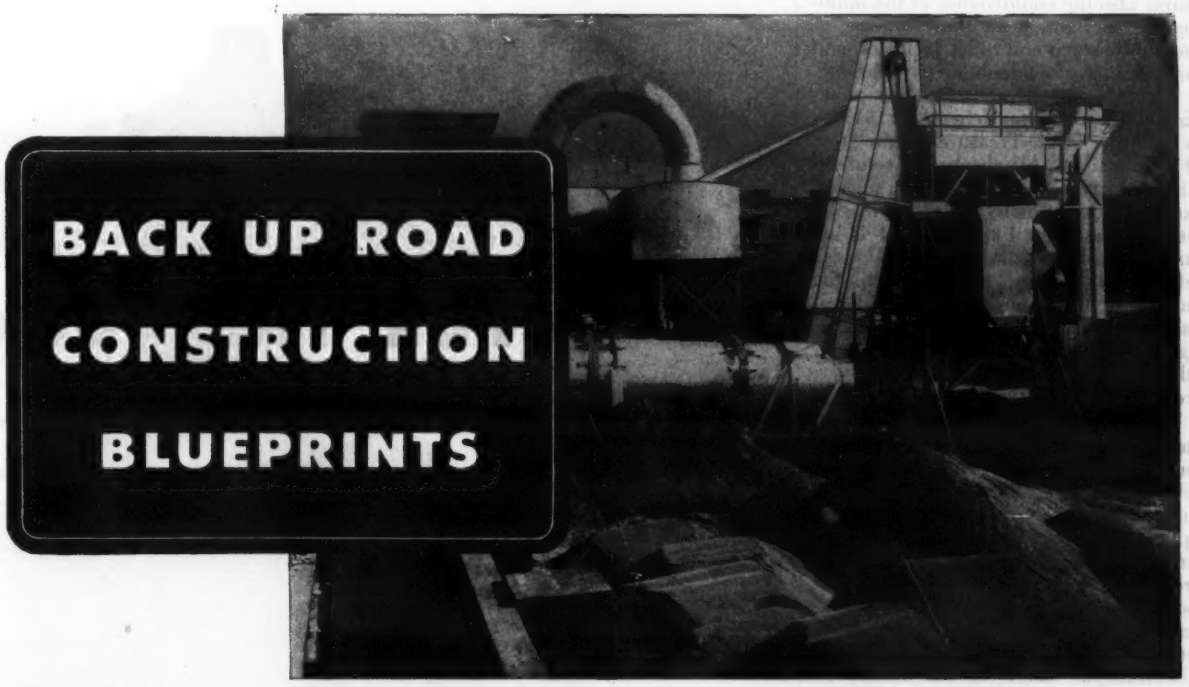


The Ellsworth County garage and shop in Ellsworth, Kansas, where the shop foreman, the sole remaining mechanic, keeps county equipment in repair.

No. 272 rotary fresno; a 6-yard LeTourneau scraper; an Austin-Western No. 11 grader; a gravel loader; four tractors, including an Allis-Chalmers HD-10, a Caterpillar RD7 diesel, and two Caterpillar Thirty tractors; five power graders, all Caterpillars, including two No. 11's, one No. 9, and two No. 10's.

In addition to road work this crew maintains the county bridges by replacing flooring and hand-rails, and keeping abutments and wing walls in condition. When labor and equipment are again made available, Ellsworth County expects to see much new road building in the vicinity of Kanopolis Dam, and considerable maintenance work on its highway system.

Salvage all waste paper. It's needed.



WITH A MADSEN ASPHALT PLANT —AND DO THE JOB FASTER!

FACTS EVERY CONTRACTOR SHOULD KNOW

Madsen has 29 years of experience in designing and constructing asphalt plants.

The Madsen line of asphalt equipment is the most complete offered by any manufacturer.

Madsen pioneered many of the major developments in asphalt plant equipment.

Only Madsen plants can offer the four following features:

THE ETERNAL CHALLENGE to black top construction engineers, contractors, and equipment manufacturers is *speed*—and *speed* is what you get with Madsen Asphalt Paving Plants.

Owners and operators report:

"It is not unusual to mix in excess of 200 tons per hour with our 3000-lb. Madsen Plant."

"We produced 149,121 tons in 8 months with our 3000-lb. Madsen Plant."

"We mixed 75,920 tons from October 1 to December 8 with our 3000-lb. Madsen Plant."

"33,000 tons of asphaltic concrete was mixed by our Madsen Plant in 26 eight-hour days."

Madsen Plants offer synchronized plant operations accelerated to the faster mixing of the high speed Madsen pug mill mixer. Seconds are saved by asphalt pressure-injection—a Madsen patented exclusive feature. Additional time is saved in the mixing operation because the asphalt is quickly incorporated in the whirling aggregates. Only 4 to 6 seconds by stop watch are required to dump the batch. These seconds saved actually produce 25 to 40 more batches per 8-hr. day.

Madsen Plants are *completely* self-erecting. No ramps, skids, cranes, or extra equipment are required with the Madsen patented jack-erection system. That's why Madsen Plants are easier to erect and easier to dismantle and move.

Six sizes of asphalt plants, four sizes of oil-mix plants and the famous Road Pug travel-mix machine make up the Madsen line of bituminous equipment. For your future plans, write for catalog MP-120.

MADSEN IRON WORKS
HUNTINGTON PARK, CALIFORNIA

4 REASONS FOR THE SUPERIORITY OF MADSEN ASPHALT PAVING PLANTS

4 EXCLUSIVE FEATURES ON EVERY MADSEN ASPHALT PLANT

1. Asphalt Pressure-Injection System 2. Sectional twin-shaft Pug Mill Mixer 3. Jack-Erection System 4. Overflow Bin

Limited-Access Road Can Pay Its Own Way

(*Continued from page 6*)

fied quality. The latest announcement that bids would be received was April 20, 1944. In that request for bids, the Merritt Parkway Commission advised "all bidders that approximately 45 per cent of the first 1,000,000 gallons of gas sold on the Merritt Parkway was a premium grade of motor fuel with a minimum octane rating of 78 ASTM. The remaining 55 per cent of gasoline sold was a motor fuel of 70 octane minimum".

Gasoline-station contracts are for a period of two years starting July 1 and the operation of a dual unit is defined as follows: "Operation shall include the sale of gasoline, oil, anti-freeze, tires, tubes, and minor accessories such as spark plugs, windshield wipers, fan belts and fuses; towing and emergency repairs; also the maintenance of the buildings as to light, heat, the cleansing of the public-room and toilet facilities, and maintenance of a telephone pay station".

All bids are required to be accompanied by a certified check for $1,000 to the order of the Treasurer of the State of Connecticut. All checks are returned within thirty days after bids are opened except those which the Commission elects to hold until the contract is actually awarded. If the successful bidder refuses to execute the contract, the amount of the deposit is held as liquidated damages. When the contract is signed, all certified checks being held, other than that of the successful bidder, are returned.

The successful bidder is further required to maintain an emergency road service as follows: "The lessee shall have available at all times at least one automobile runabout, panel-body type, equipped for remote emergency road service. This truck shall have a compressed-air tank, hose, and gage, and tools for changing tires; a tank of at least 5-gallon capacity which will accurately measure and dispense motor fuel; miscellaneous small tools necessary to effect minor repairs such as the installation of a fan belt or spark plug; and shall be furnished with a fire extinguisher, first-aid kit, red flags, warning flags, and large spotlight. The vehicle shall be painted in a manner to be approved by the Highway Commissioner. The schedule of road service prices shall be approved by the Highway Commissioner in the interest of establishing uniform charges throughout the Parkway for such road service."

A sufficient number of automobiles become inoperative on the Merritt Parkway for reasons of tire trouble, lack of fuel, or minor motor difficulty to warrant the maintenance of such an emergency road service. State police officers on the Parkway patrol notify the nearest service station of the needs of a stalled vehicle. Any automobile requiring major repairs is towed off the Parkway premises by other than the lessee under these gasoline-station contracts.

The facilities supplied by the State Highway Department at the premises licensed under these contracts include the two buildings composing the dual gas station and driveways at the adjacent parking areas. Also included are two 4,000-gallon and four 2,000-gallon underground gasoline storage tanks.

The contractors, that is, the successful bidders, are required to supply air compressors and air dispensers, fire extinguishers, a safe, desk, chairs, files, and other office equipment, paper towel and soap dispensers, telephone pay station, emergency service vehicle, and any other appurtenance necessary to conduct the business.

The payments to the State Highway Department for sales are made monthly on or before the tenth day of each month on the sales of the preceding calendar month and are accompanied by a statement showing the sales of all gasoline at each pump of the dual station. Records must be kept and made available to the Parkway Commission or to the State Highway Department of the gallonage deposited in the tanks, the gallonage dispensed through vending pumps, and the amount gaged in the tank when inventory is taken. The revenue accruing to the State Highway Department from gasoline sales is figured on the basis of the actual number of gallons of gasoline sold, multiplied by the price bid per gallon. The monthly rental of $500 is paid in advance, the first payment being due between July 1 and 10 of the initial year of the contract. For each subsequent month it is paid at the same time and in the same check as the royalty payment on sales is made.

Both units of the gasoline stations are required to be in full and continuous operation 24 hours daily, and may not

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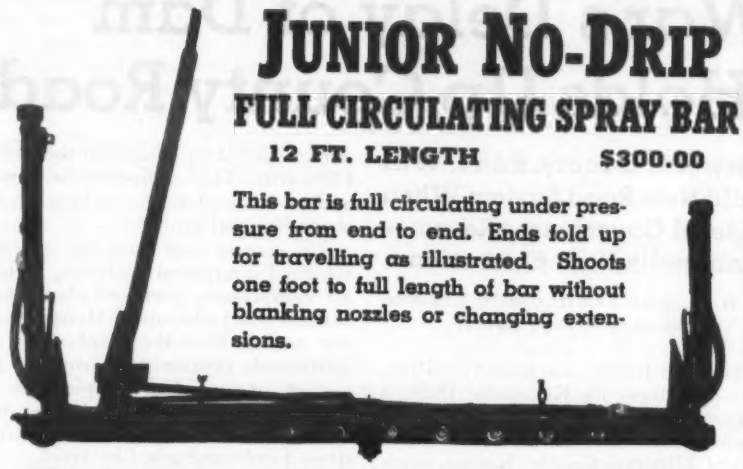
JUNIOR NO-DRIP

FULL CIRCULATING SPRAY BAR

12 FT. LENGTH **$300.00**



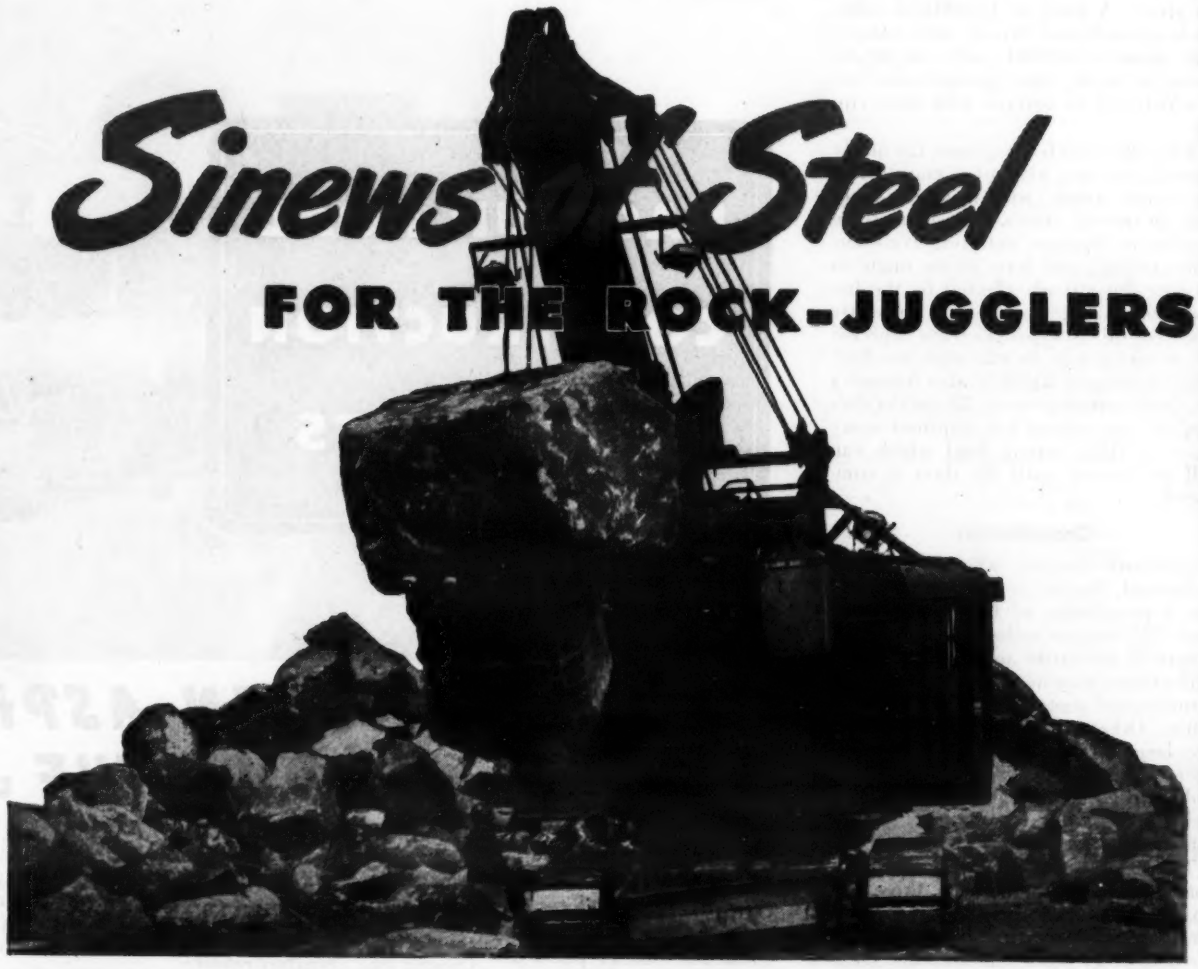
This bar is full circulating under pressure from end to end. Ends fold up for travelling as illustrated. Shoots one foot to full length of bar without blanking nozzles or changing extensions.

Write for literature on this bar and also the CARTWRIGHT HOT SPRAY BAR—AIR CONTROL and FIFTH WHEEL GOVERNOR.

CARTWRIGHT ASPHALT EQUIPMENT CO., Galion, Ohio

Sinews of Steel

FOR THE ROCK-JUGGLERS



The stone you see poised on the dipper weighs more than two tons per cubic yard. Yet the powerful shovel seems to handle it like a pebble.

The shovel in the picture was delivered equipped with Bethlehem Wire Rope. It's a bread-and-butter application . . . nothing spectacular, but one that demands the best wire rope you can buy. When a shovel is rigged with Purple Strand (Bethlehem's top-grade rope), its lines are equipped to withstand the grief that's a daily feature of quarry and excavating work.

If your job calls for a highly flexible rope, designed for easy curving around sharp bends, ask for Purple Strand Form-Set. A Form-Set rope is one that's been preformed; relieved of internal tension that sometimes shortens working life. But increased life is not the only advantage. Preformed rope is relaxed, supple; it's easy to handle, easy to rig, easy to spool.

Bethlehem craftsmen are old, experienced hands at wire-rope making. And Bethlehem representatives are thoroughly familiar with conditions in the field, so that their recommendations are well worth considering. Before you rerig your shovel, derrick, or crane, see one of our men. Some of his tips may save you time and money.

When you think WIRE ROPE

. . . think BETHLEHEM

Limited-Access Road Can Pay Its Own Way

(*Continued from preceding page*)

be closed for any reason without the permission in writing of the Merritt Parkway Commission. Other requirements of the contracting party operating the stations are that he shall supply and pay for at his own expense all licenses and permits as may be required. He must pay for lights and heat, although the State Highway Department pays for the water used. The State mows the grass and maintains the exterior premises and plows the snow from the driveway and parking areas. The lessee must keep the rest rooms, office, and public space in a neat, clean, and sanitary condition, and keep the immediate vicinity of the station free from papers, trash, and miscellaneous debris. The lessee is permitted to erect suitable signs adjacent to the station, but is expressly warned that he must not place any other signs, banner, placard, or other advertising device on the Parkway without the written permission of the Commission.

Bids and Income

The gasoline companies which were awarded the contracts at the three stations made the following royalty bids and contracted to pay the monthly rents recorded below for the respective contract periods:

	Royalty/gallon	Rent/month
New Canaan Stations		
May 22, 1940-June 30, 1942	$ 0.0339	$ 250
July 1, 1942-June 30, 1944	0.0386	500
July 1, 1944-June 30, 1946	0.0289	500
Fairfield Stations		
July 1, 1941-June 30, 1944	0.03562	500
July 1, 1944-June 30, 1946	0.01940	500
Greenwich Stations		
April 1, 1942-June 30, 1944	0.0373	500
July 1, 1944-June 30, 1946	0.0187	500

Inasmuch as gasoline rationing began soon after Pearl Harbor, the income at the various stations is less for the 1942-43 fiscal year than for 1941-42, as shown in the following statement of gas-station receipts for those two fiscal years.

	1941-42	
New Canaan	$34,088.00	full twelve months
Fairfield	34,143.50	" " "
Greenwich	7,093.04	three months
Total	$75,324.54	
	1942-43	
New Canaan	$14,037.04	full twelve months
Fairfield	14,803.66	" " "
Greenwich	13,688.77	" " "
Total	$42,529.47	

A further effect of ODT and OPA rulings is shown in the bid prices for the 1944-46 contract biennium where the royalty rates were cut materially by the bidders. Due to the fact that government restrictions forbid petroleum companies to add new stations, the Merritt Parkway stations had to be operated by the companies then holding the contracts or a new company would have had to reduce the amount of gasoline sold at some other station in the district in order to take on the business of stations on the Parkway.

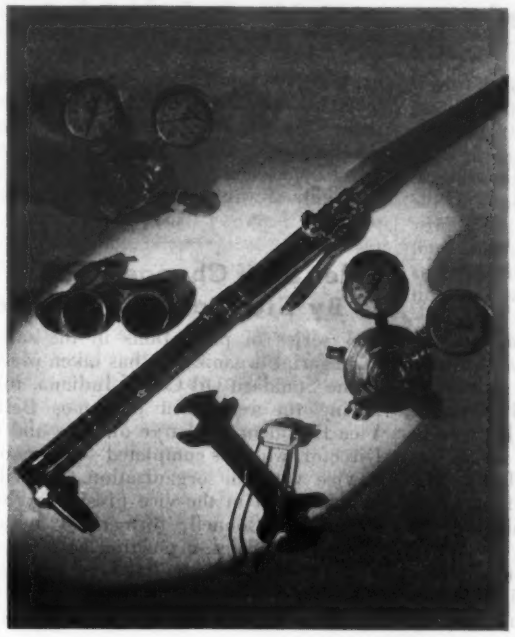
Concessions Pay for Maintenance

Referring to the table of gas-station receipts for the year 1941-42, the last fiscal year in which the use of motor vehicles was not restricted by wartime regulations, it will be noted that the total income was $75,324.54. If we assume that the Greenwich station income would have been four times as much as shown, had the station been operated for a full year, we would have an income for that station of $28,372.16 or a total income from royalties and rent from all stations of $96,603.66. The cost of maintaining the Merritt Parkway for all requirements for the latest year, 1943-44, was $95,739.16. We use this figure assuming that, in general, maintenance costs increase with the age of any utility. This leaves a margin of only $864.50 which would be consumed several times by a winter of very heavy snowfalls.

Still remembering that the money received from royalties and rents on the Merritt Parkway is not credited to the maintenance account of the State Highway Department but just to general highway funds, we can see, however, that the amount of money received from concessions does balance the cost of maintenance. In order to create a further cushion against unusual maintenance items, such as snow removal, the Merritt Parkway Commission is seriously considering a post-war project to construct a large restaurant at a suitable site on the Parkway from which it expects the royalty and rent income would amount to at least $30,000 a year.

Conclusion

It is believed that the figures previously presented show that, on an expressway or limited-access highway of sufficient length to permit the construction of gasoline stations at approximately 15-mile intervals, a highway department can secure sufficient income from these stations to offset the cost of maintenance of these very necessary traffic facilities. This is done through concessions without adding a tax burden on the motor-vehicle operator.



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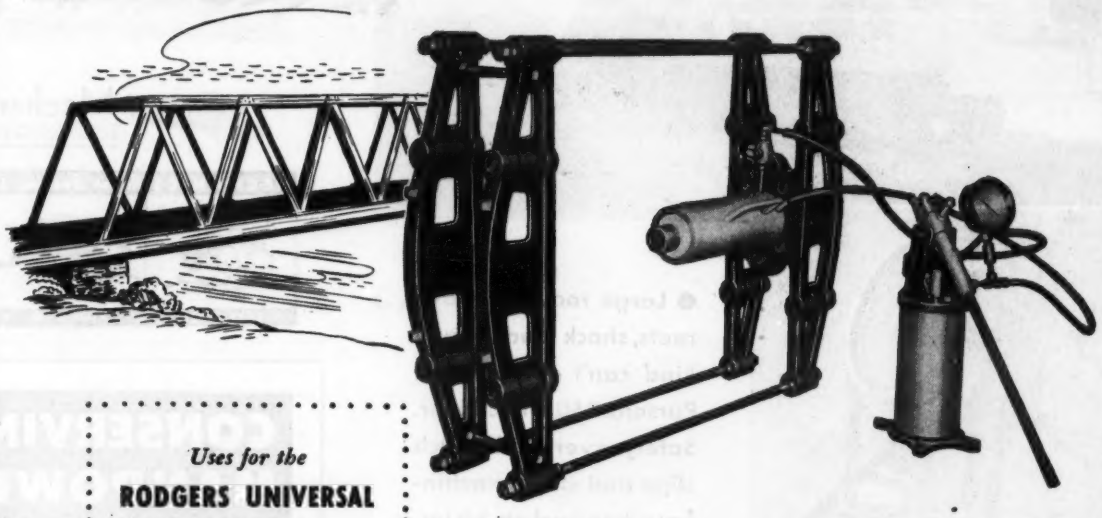

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$800,000,000 Asked For New York Roads

In his annual message to the New York State Legislature, Governor Thomas E. Dewey recommended an $800,000,000 highway construction program in New York State to be spread over several years, with work starting as soon as the war will permit. Governor Dewey stressed that his highway program is not a post-war plan but that it is intended as a major project to be undertaken as soon as possible.

It is reported that there are 13,000 miles of Empire State highways which are greatly in need of repairs, with about one-third so far gone that their complete reconstruction is necessary. The condition of New York's highways, which was reported on in the Governor's last annual message, has been aggravated by the curtailment of highway work during the war.

Governor Dewey's recommendations were based on conferences with Charles H. Sells, New York State Superintendent of Public Works. In outlining his highway program, the Governor also stressed the need for new highways and expressways, parkways, through highways in cities, and highway aid to cities, as well as repairs to existing roads. Under this program, work on the preparation of plans, surveys and the acquisition of rights-of-way can be started immediately.

Sales Staff Changes Made By Standard of Indiana

A series of promotions in the sales managerial organization has taken place at the Standard Oil Co. of Indiana, following the retirement of Amos Ball, Vice President in charge of sales and a Director, who has completed 48 years of service with the organization. He will be succeeded in the vice presidency by Roy F. McConnell, formerly General Manager of Sales, a position now filled by H. E. Hanson, who has been ranking Assistant General Manager. R. F. Baity will take Mr. Hanson's place and J. W. Honomichl moves from the Des Moines, Iowa, Sales Division to serve as an Assistant General Manager of Sales for the central division in Chicago. In connection with these changes, the title of L. C. Welch has been changed from Manager to General Manager of the Lubricating and Sales Technical Service Departments.

Branch office appointments include R. T. Kinneman, formerly Manager at La Crosse, Wis., as Manager of the Des Moines Sales Division; D. J. Byers, formerly Assistant Manager at St. Louis, Mo., as Manager of the La Crosse office; and H. L. Poole, from the general office staff, as an Assistant Manager in St. Louis.

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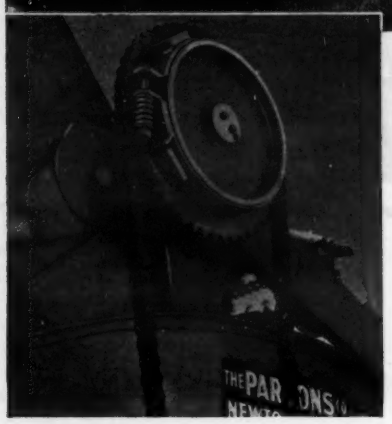

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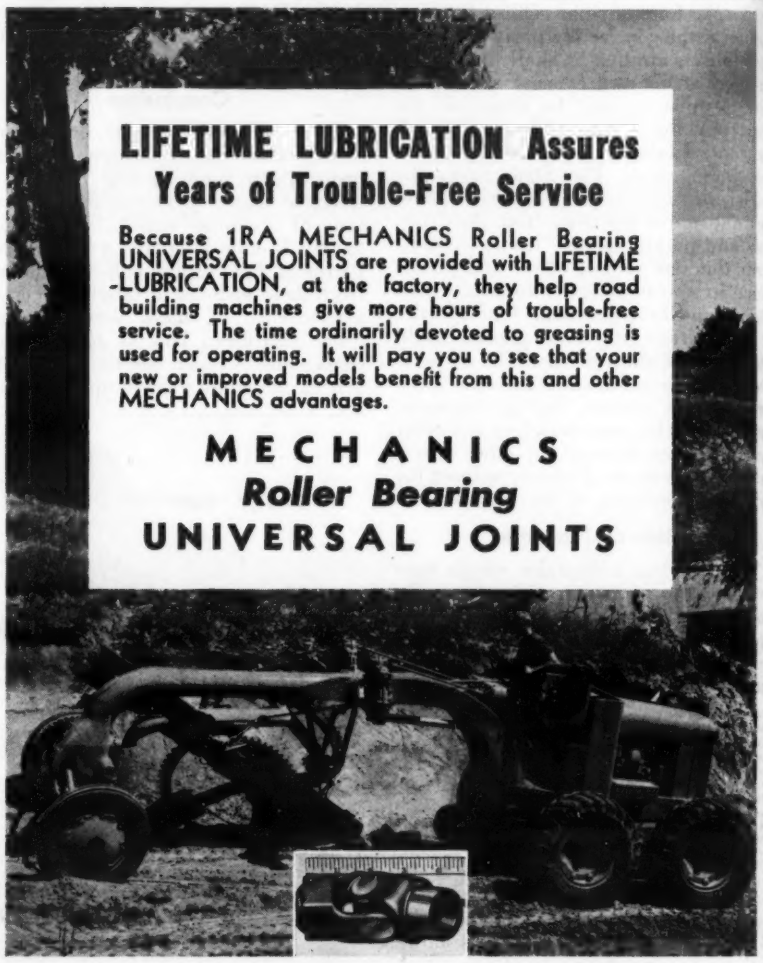
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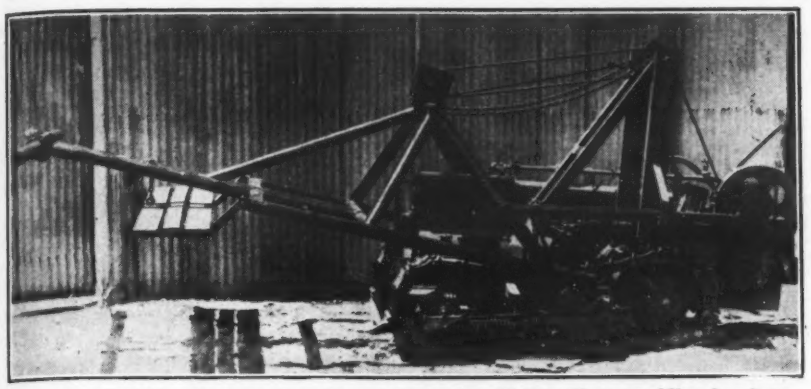


To help offset the shortage of equipment during World War II, arc welding has been used to fabricate many new devices or machines. This driller or jumbo was built and mounted on a crawler tractor.

Arc-Welded Jumbo For Smaller Tunnels

By converting a crawler tractor into an air-driven unit and mounting a boom that can be raised and lowered on the front of the tractor, Galena Machine & Electric Co. of Galena, Kans., developed a jumbo which will carry two drillers with their drills for work in small tunnels. The tractor is driven up to the face of the tunnel, the boom is raised to the proper height, and a row of holes drilled. Then the boom is lowered twice for other rows of holes, the tractor moved to another set-up, and the process repeated. With this machine, it is reported that two drillers can do the work of six using the post or tripod method.

In building this jumbo, the internal-combustion feature was removed from the engine and an air head with four slide valves substituted. The crankshaft was cut at the center bearing and one-half of it given a quarter turn, then welded back together, straightened and refinished. This places the throws of the shaft at 90 degrees around the center.

The camshaft is driven by sprockets and chain and is timed to admit air to the cylinders at the point where the pistons are at the top of the stroke. The boom is constructed of 3-inch extra-strong pipe, one end pivoted to a 3-inch double extra-strong pipe by means of 2¼-inch pins fastened in each end of the 3-inch pipe with set screws. This double extra-strong pipe replaces the spring in front of the tractor and supports the engine.

At the other end of the boom, a 3-inch extra-strong pipe 8 feet long is fastened in the two clamps at the end of the boom and two rock drills are mounted on this plate.

The drill operators stand on a platform which is hinged to the boom at the back and supported in front by a chain which is adjustable to keep the platform level. An air-driven winch is built from a Model A block assembly in the same manner as the engine. The winch drum is mounted above the engine and both are contained in an arc-welded 3-inch angle-iron frame. The cable from the winch goes to the derrick and through 3-sheave fall blocks on both the derrick and the boom. On one side of the tractor just above the tracks is an air receiver fabricated of 8-inch pipe, 5 feet long with pipe couplings welded on, from which air is taken to run the winch, the tractor motors, and the two rock drills.

The data and photograph were furnished through the courtesy of Hobart Brothers, Troy, Ohio, from information submitted in its Arc Welding Contest.

Line of Air Filters

The latest Protectomotor and Staynew intake filters for compressors and internal-combustion engines, as well as pipe-line filters for fuel and lubricating oils, and filters for engine crankcase breathers, are described and illustrated in bulletins now available. Most of the types included feature the well known radial fin inserts which are removable and cleanable.

Copies of these bulletins will be sent promptly to readers of CONTRACTORS AND ENGINEERS MONTHLY who write direct to the Dollinger Corp. (formerly Staynew Filter Corp.), 11 Centre Park, Rochester 4, N. Y., and mention this review.

Barber-Greene Has New Wisconsin Sales Set-Up

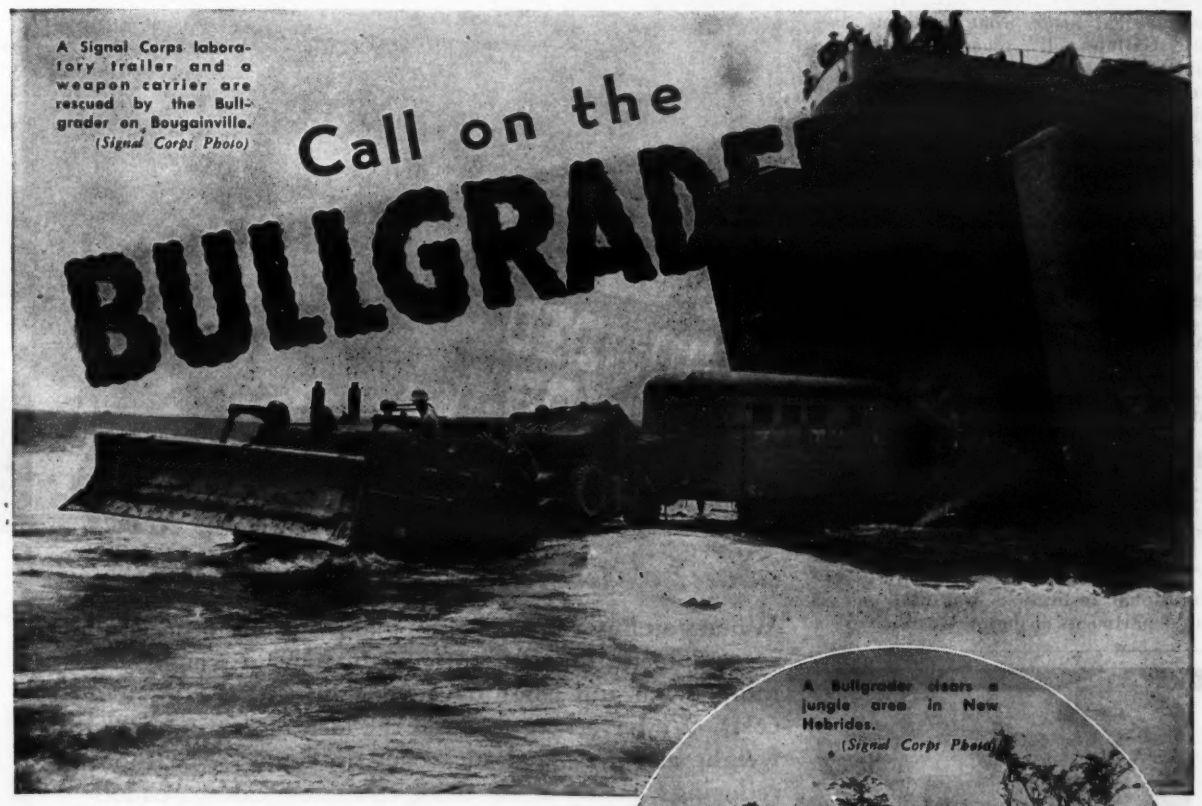
A number of new representatives in Wisconsin, serving both its industrial and construction divisions, have been appointed by the Barber-Greene Co., Aurora, Ill., maker of asphalt-paving equipment and materials-handling machinery. The Barber-Greene office in Milwaukee has been replaced by this new set-up.

The new appointees are: The Brebner-Sinz Machinery Co., Inc., 1744 So. Broadway, Green Bay, Wis., with a branch office at 5th & Spring Sts., Marquette, Mich., representing both the Construction and Industrial Divisions in northeast Wisconsin and upper Michigan; The Milwaukee Power Equipment Co., 525 N. 22nd St., Milwaukee 3, Wis., for the Industrial Division only, in southeast Wisconsin; The Stone Mfg. Co., 321 No. 25th St., Milwaukee, Wis., for the Construction Division, in southeast Wisconsin; Miller, Bradford & Risberg Co., Eau Claire, Wis., covering southwestern Wisconsin for both Construction and Industrial, and the northwestern part of the state for Construction only; and Wm. H. Ziegler Co., whose main office is in Minneapolis, Minn., in northwest Wisconsin for the Industrial Division only.

Gierke-Robinson Co., 328 W. 4th St., Davenport, Iowa, will represent the Construction and Industrial Divisions in southeast Iowa and seven Illinois counties adjacent to Davenport; and Gibbs-Cook Equipment Co., 1314 Walnut St., Des Moines, Iowa, will serve both the Construction and Industrial Divisions in central and northeastern Iowa.

L. A. Larson, formerly District Manager of the Milwaukee office, has been promoted to the post of Area Manager for Area No. 6, which includes Wisconsin, Minnesota, North Dakota, South Dakota, Montana, Wyoming, Nebraska, Iowa, and a section of northwestern Illinois. He will have headquarters in Minneapolis.

Keep on buying War Bonds!



A Signal Corps laboratory trailer and a weapon carrier are rescued by the Bullgrader on Bougainville. (Signal Corps Photo)

A Bullgrader clears a jungle area in New Hebrides. (Signal Corps Photo)

This Bullgrader cleans up debris of a demolished Jap refinery. (Signal Corps Photo)

In this war it's a habit to call on Bucyrus-Erie Bullgraders for fast work on a host of difficult jobs — from routing out buried pillboxes and 'dozing through shattered ruins to rescuing mired vehicles and clearing out jungle for agriculture. The speed and ease with which it handles its work makes this versatile unit a popular, efficient handyman.

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Young Engineers Needed By State Highway Depts.

W. H. Root of Iowa Presents Salary Data to Session of Committee on Administration At AASHO Annual Meeting

✦ IT is well known that state highway departments feel that they are not attracting a sufficient number of capable young engineers to their organizations to maintain the quality of service necessary in those departments. Rather than presenting a personal opinion to the Committee on Administration of the American Association of State Highway Officials at its Thirtieth Annual Meeting in Cincinnati, Ohio, W. H. Root, Maintenance Engineer, Iowa State Highway Commission, made what he terms "a little Gallup poll" regarding salaries paid to engineering employees of highway departments as evidence that something must be and can be done to increase the number of post-war young engineering employees.

What Engineering Schools Say

Mr. Root polled a number of the leading engineering schools of the country to see what they thought of state highway jobs for their engineering graduates. In answer to the question, "What are the pertinent things a job should offer to interest capable young engineering graduates?" the professors indicated the following:

1. A salary equivalent to the normal salary in industry.
2. Continuity of employment.
3. Prospects for advancement and reward for special ability.
4. Freedom from politics.

The almost unanimous opinion of the educational institutions was that highway departments at the present time are not meeting even a fair percentage of the above qualifications.

The next question asked the engineering schools was perhaps a little unfair, according to Mr. Root. It was: "Do you recommend that your better graduates apply for state highway jobs; do you take a neutral attitude; or do you recommend against their taking such jobs?" Naturally, they practically all answered that they tried to be neutral in this matter. However, it was evident by their replies that under present conditions they are certainly not urging highway jobs on their graduates.

(*Concluded on next page*)

Average Salaries Paid to Engineers by Various Employing Groups

Questions	State Highway Departments	Public Roads Administration	Counties	Cities	Railroads	Industries	Ave. of All Except St. Hwy. Depts.
What is the average monthly salary paid by you to young engineering graduates?	$138	$203	$148	$208	$156	$167	$173
If such graduate makes good and continues to work for you 10 years, about what average salary can he hope to be drawing?	$253	$319	$258	$285	$312	$305	$287
Assume an engineer aged sixty has worked for you for a period of 25 years; that during that time his average salary has been $200 per month. He is now drawing $300 per month. If he is incapacitated on account of age or injury, would he draw a retirement wage, and if so, how much per month?	$115*	$107	$102	$120	$45	$70	$87
What other benefits do your jobs offer engineers?	Sick leave; vacation	Opportunity for advancement; continuity of employment; automatic promotions; annual leave; sick leave; vacation	Sick leave; vacation	Sick leave; vacation; Civil Service	Medical and hospital care; promotion; vacation; passes	Sick leave; vacation; opportunity for advancement; death benefits	

*Represents average of 50 per cent of replies; other 50 per cent have no retirement plan.

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When you buy crushing equipment—or any other kind of equipment, for that matter—the more it weighs, the more metal and labor have gone into it, the more it costs. We have long fostered the idea of cutting down weight and we have succeeded in doing so without reducing capacity or impairing efficiency. Compare modern Universal plants with heavier, bulkier plants and you will find that Universals will give you as much or greater output with even lower maintenance costs. Eliminating this excess baggage has made Universal plants easier on roads and easier to move.

Looking back over the past 39 years you'll find Universal engineers have never been idea-shy. Starting with the overhead eccentric jaw crusher, they have given the industry many developments which have become standard. In the coming postwar period, look to Universal for new developments—continued leadership.

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Better Salaries Will Attract Young Engrs.

(*Continued from preceding page*)

To illustrate the replies received to the fourth question, which was: "If it is true that highway departments are not attracting the best young graduates, what should they do to make highway engineering jobs more acceptable?", Mr. Root presents quotations from their letters which, although out of context, he believes indicate the thoughts of the writers.

"I am afraid that the advancement of many men is hampered by political set-ups."

"In some highway departments older men are in charge and they have not encouraged the use of new ideas."

"The salaries of highway departments are not attractive when compared to those paid by private corporations."

"Highway departments construct highways and maintain them; but they do not operate them, and therein they differ from railways and from industry. They cannot offer the variety of attractive positions associated with operation."

"The highway departments may adopt either of two policies: (a) hire mediocre men of small ambition and keep them permanently in routine jobs, advancing some of the better of them to the key positions, or filling the key positions with outsiders; or (b) hire high-grade young graduates, some of whom will stay to fill the key jobs while the others move on into other fields. The highway department can be a cul-de-sac or a gateway to opportunity."

"I think that all that it is necessary to do to attract some of the best engineering graduates to highway department work is to make the salaries all along the line comparable to those offered in other fields and get rid of the political influences which the students detest. If that is impossible, then it is impossible for the highway departments to get the better students."

What the States Offer

After the survey among the engineering schools, Mr. Root wrote to a number of states, some of which have retirement plans, to find out just what is being offered young engineers by the state highway departments. The first question asked this group was: "Do you consider that your wage scale and other job benefits which you are able to offer will attract the better engineering graduates in the post-war period?". The answer was a resounding "No", with one exception, and a study of the situation in that particular state made it clear why they were able to answer "Yes", and incidentally to a certain extent indicates what other states must do in order to answer this question in the affirmative.

The other questions submitted to the state highway departments were the same as those submitted to the Public Roads Administration, to a number of the larger counties of the country, to a number of city administrations, and a large number of industries which compete with highway departments for young engineers. These questions were:

1. What is the average monthly salary paid by you to a young engineering graduate?

2. If such graduate makes good and continues to work for you for 10 years, about what average salary can he hope to be drawing?

3. Assume that an engineer aged 60 has worked for you for a period of 25 years; that during that time his average salary has been $200 per month. He is now drawing $300 per month. If he is incapacitated on account of age or injury, would he draw a retirement wage, and if so, how much per month?

4. What other benefits do your jobs offer engineers?

The replies to these four questions have been summarized in the accompanying table.

Conclusion

It would seem that the replies to the questionnaire sent out by Mr. Root (1) prove that the state highway departments have a real problem in the matter of building up and maintaining their engineering forces after the war; (2) show rather specifically what this problem is; and (3) suggest at least some possible remedies.

The situation is not at all hopeless. A disease properly diagnosed is at least half whipped. Highway departments are entering into a period of strenuous activity in highway construction, and this program will present in the future a real opportunity to young engineers. Mr. Root pointed out, however, that highway departments must realize that this is 1945, not 1915. They cannot hope to solve the problems of the 1945-55 decade with "Model T" methods.

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Factors Involved In Airport Work

The Four Stages of Action In Building an Airport Are Closely Integrated With Its Design

By GEORGE E. GARANFLO, District Airport Engineer, Civil Aeronautics Administration, Charlotte, N. C.

✦ IN discussing airport construction, it is necessary at times to digress into the subject of design, because it is practically impossible to dissociate the two subjects entirely. The construction of an airport may be divided into four stages: (1) clearing and grubbing; (2) drainage; (3) grading; (4) airport wearing surface.

Clearing and Grubbing

Offhand, the clearing of an airport site and approaches does not appear very important. However, the extent of the usable area of an airport depends entirely upon the clearance of the approach zones. The entire landing area of the airport must be cleared and grubbed, that is, all trees must be cut and disposed of, and all stumps, roots, and vegetable matter should be excavated, burned, or removed from the site. The areas in the approach zones to each landing strip must be cleared of all trees and other obstructions. An approach zone is the area located at the end of each landing strip, trapezoidal in shape, 500 feet wide at the end of the landing strip and widening out to 2,500 feet in 2 miles. The angle of flare on each side is 5 degrees 25 minutes. The ratio of glide in the approach zone to a Class 1 airport is 20 to 1, or an angle of 2 degrees 52 minutes, while the ratio of glide in the approach for a Class 2, 3, or 4 airport is 30 to 1, or an angle of 1 degree 55 minutes. On runways used for instrument landings and at military airports, the glide ratio is 40 to 1, or an angle of 1 degree 26 minutes.

Unless all trees or obstructions in the approach zone are removed, the effective usable length of a landing strip may be reduced. For instance, a 50-foot tree located at the end of a landing strip of a Class 1 airport would reduce the usable length of this strip 1,000 feet. All trees and obstructions in the turning zones which lie between landing strips should be cleared to a 7 to 1 ratio.

Grading

Grading operations should not be started until after completed plans have been made for the full development of the airport. These plans should be carefully followed. Also a study should be made of the classification of the soil structure and, if possible, a soil profile made in order to determine what soil will be used and where hauled, and also the soil that cannot be used and will be wasted.

The topsoil that will be used for the surface should be stockpiled until such time as grading operations have advanced sufficiently to permit placing it directly upon the finished subgrade. This will save the cost of rehandling this material. All unsuitable plastic or unstable material as indicated on the soil profile should be excavated 12 inches below the proposed subgrade, wasted, and the area filled with selected material.

Runway grades should be held to a minimum to insure safe operation of aircraft. The maximum longitudinal grade for a Class 1 and Class 2 airport is 2 per cent and for a Class 3 airport the maximum is 1½ per cent. If possible, it is advisable to hold to a 1 per cent grade. Landing strips with grades in excess of 1 per cent will erode to a greater extent than landing strips with a lesser grade. Of course, the character of the soil is a controlling factor.

The ideal transverse slope for land-

(Continued on page 84)

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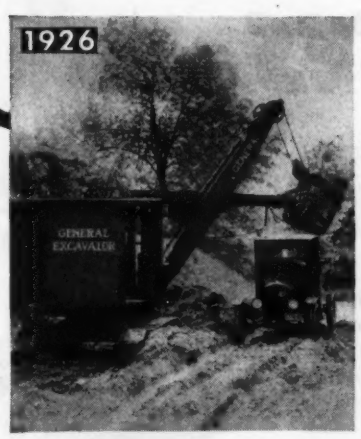
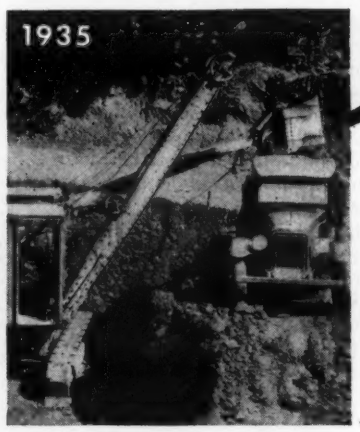
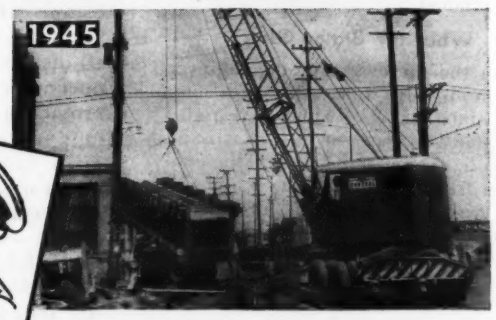
*Official records are incomplete on the other 2%, since many of them have passed from the hands of their original owners without General's knowledge.







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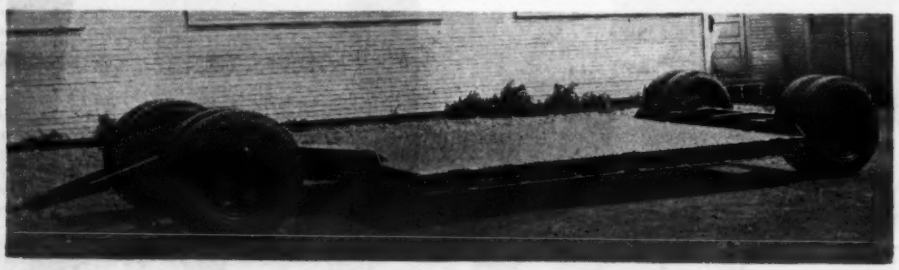

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C. & E. M. Photo
Topsoil was spread on a 1 on 3 slope along the Detroit Industrial Expressway by a box float handled by a Lorain 75A crane.

Slope Stabilization On New Detroit Route

(*Continued from page 9*)

at a rate of about 100 pounds to the acre with the following mixture:

Domestic perennial rye	25 per cent
Kentucky bluegrass	20 per cent
Redtop	25 per cent
White Dutch clover	10 per cent
Canadian bluegrass	20 per cent
	100 per cent

This third method of stabilizing the cut slopes involved no extra cost, as one drain of shallow depth at the toe of the slope was substituted for either one or two deep-trench drains. By this method, Michigan engineers feel that the problem of slope stabilization is solved.

Roadway Foundations

Before earth work began in either the cut or fill sections, the topsoil was first removed for a depth of about a foot. This material was stockpiled for surfacing slopes and ditches. Where the fill was 4 feet or more, the excavated area was backfilled with sand; in fills less than 4 feet, clay was used as backfill material outside the roadway area. Fill material, as well as a minimum 2-foot layer beneath the pavement in the cut sections, consisted of a pervious sand-gravel combination which was obtained from borrow pits in the vicinity of the Expressway.

The heavy blue clay which was removed from the subgrade was particularly hard to handle as the shovels dug it out in solid chunks. Sand had to be sprinkled on the bottom of the trucks engaged in hauling so that the clay would slide out when ready to be dumped. Also the tail-gates on the trucks had to be raised to permit the large pieces to slide through. If any of this clay was spilled over the concrete roads while being hauled, it hardened so solidly that it later had to be removed with the blade of a power grader.

Borrow Pits

To make the sand core in the fill sections which, in some places, constituted an embankment 8 feet high, large quantities of suitable material were necessary. Four large borrow pits located north of the Expressway were the chief sources for both the embankment material and for the subgrade in the cuts. Some of this borrow acreage was owned by the Ford Motor interests and agreements were made whereby the State could obtain suitable sand-gravel material, provided the pits were backfilled with the clay which was excavated from the Expressway.

Over 300,000 cubic yards of sand-gravel were taken from one area immediately north of the Expressway and just west of the Rouge River. The topsoil was first removed and stockpiled and then anywhere from 4 to 6 feet of borrow was excavated to within 6 inches of the underlying stratum of clay. Later, clay from the depressed sections was deposited here and allowed to stand awhile to dry out so that it could be worked with bulldozers and spread over the area.

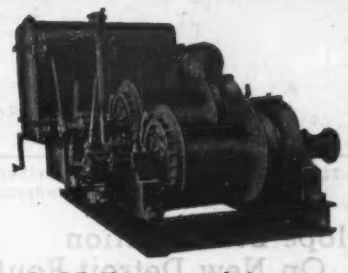
Another borrow pit 3,000 feet north of the right-of-way and just west of Greenfield Road yielded 200,000 cubic yards. This was an area of numerous knolls 4 to 8 feet high. The removal of one knoll alone resulted in 60,000 cubic yards. As this plot of ground is being considered as a site for a future housing development, the rolling nature of the topography was retained during the backfill operations. After backfilling all borrow pits, the topsoil was replaced and seeded. In a remarkably short time the ground looked the same as it had before excavation began.

Crossing the City Dump

At the very eastern end of the Expressway, west of Wyoming Road, is a yard for brick making. Clay for this industry had been taken from the adjoining area, including the ground now occupied by the Expressway. The big excavation caused by the removal of clay over the years has been used as a city dump. Here was a fine accumulation of rubbish, cinders, tin cans, etc., which had to be removed for a full depth of some 13 feet.

(*Concluded on next page*)

OK HOISTS *for every purpose*



As O.K. Hoists are made in many different models ranging from 8 to 150 horsepower, you are sure to get a machine that exactly meets your requirements. Write for Catalog No. 10.

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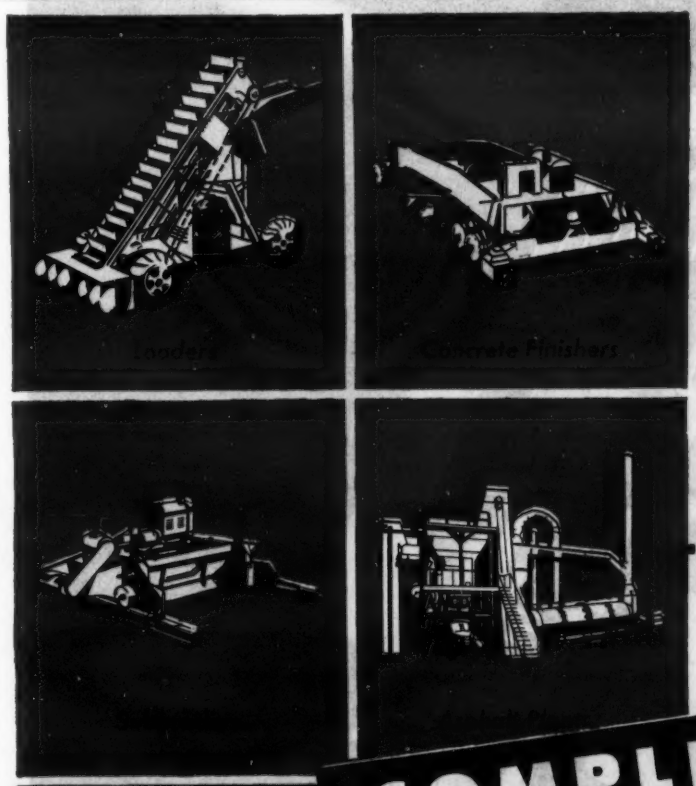

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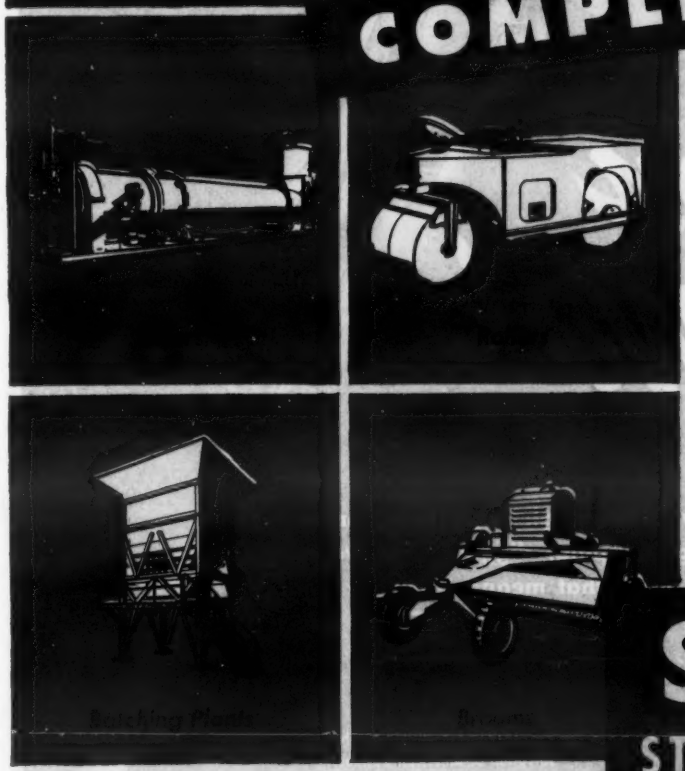

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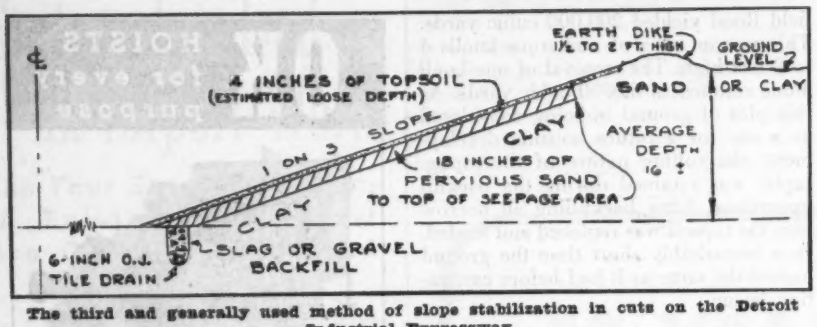


The third and generally used method of slope stabilization in cuts on the Detroit Industrial Expressway.

Slope Stabilization On New Detroit Route

(Continued from preceding page)

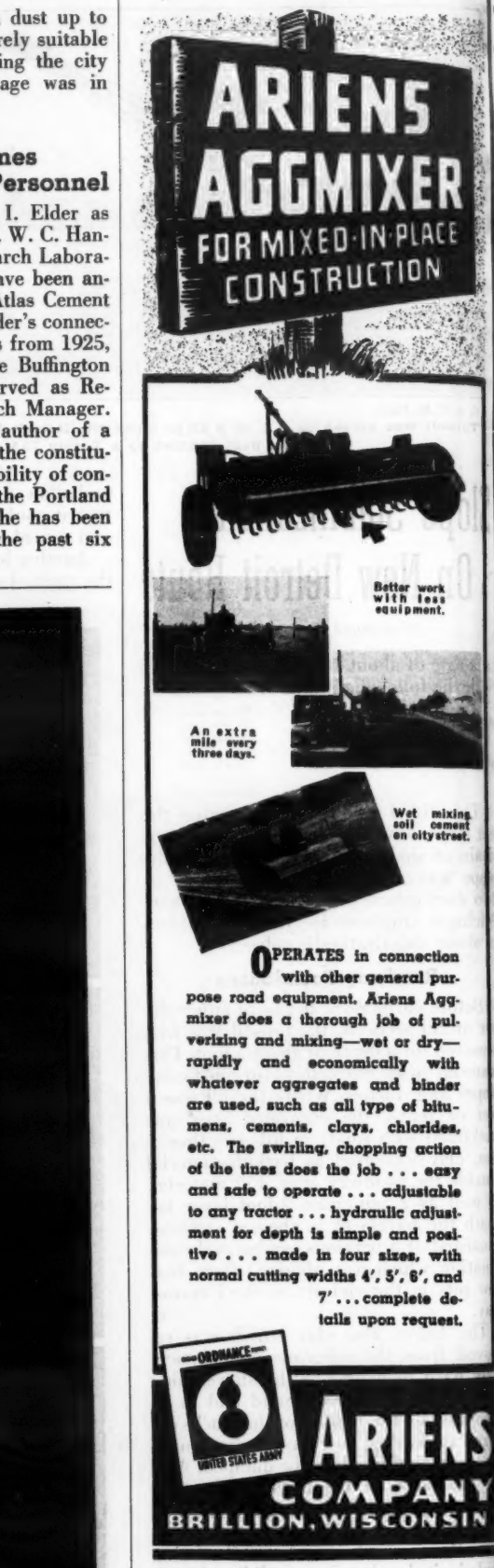
This rubbish had to be hauled from 1 to 3 miles north of the Expressway to some waste lands along the Rouge River. As this strange assortment of junk was dumped, it was covered with sand to provide traction for the trucks which were end-dumping. Bulldozers pushed the material around and spread the stabilizing sand.

This huge cut had to be filled with stable material and the borrow pits in the neighborhood were about exhausted. Recourse was had to a limestone quarry at Sibley, Mich., 10 miles to the south. Here was an inexhaustible supply of quarry screenings which ordinarily would be waste material. This "Sibley" stone had a gradation from dust up to ¾ inch in size and was entirely suitable for the purpose of backfilling the city dump. The only disadvantage was in the high "overhaul" costs.

Universal Atlas Names New Research Personnel

The appointments of D. I. Elder as Research Consultant and Dr. W. C. Hansen as Manager of the Research Laboratories at Buffington, Ind., have been announced by the Universal Atlas Cement Co., New York City. Mr. Elder's connection with the company dates from 1925, starting as a chemist at the Buffington plant, and he has since served as Research Chemist and Research Manager.

Dr. Hansen, who is the author of a number of publications on the constitution of cement and the durability of concrete, comes to Atlas from the Portland Cement Association where he has been engaged in research for the past six years.



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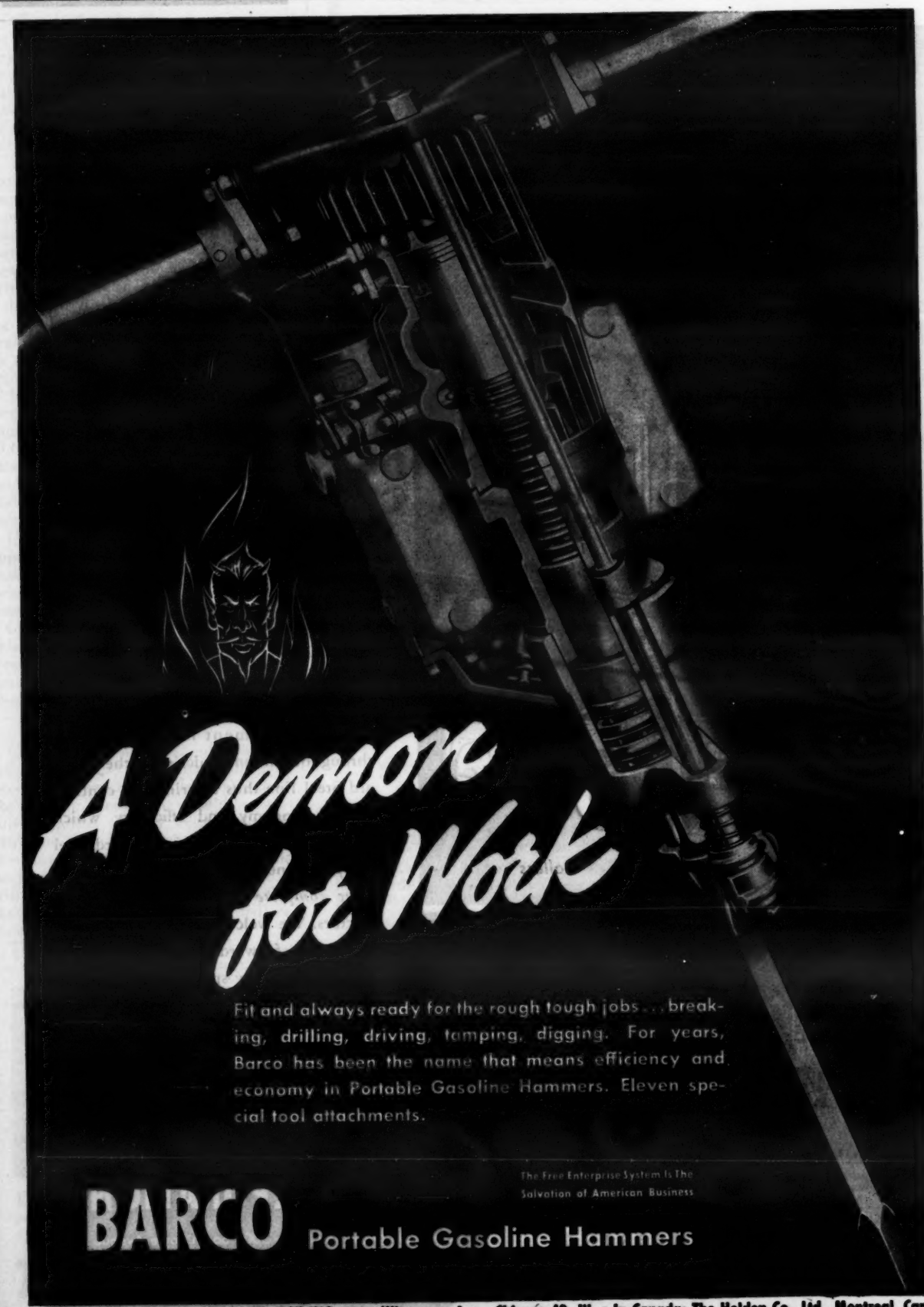
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Will YOU Help?

BUY BONDS!

Earth and Hard Rock Moved for Dual Road

New 1.6-Mile Approach To Delaware River Bridge Is Under Construction at Phillipsburg, N. J.

A NEW approach highway, 1.6 miles long, is being constructed by Fred Berlanti & Son, Inc., of Harrison, N. Y., for the New Jersey State Highway Department to improve access to the Delaware River Toll Bridge connecting Easton, Pa., and Phillipsburg, N. J. This four-year-old bridge in western New Jersey handles a great amount of interstate traffic, since the free bridge over the Delaware, just south of the toll structure, is not considered strong enough to carry heavy trucks. The present New Jersey approach to the Easton-Phillipsburg Bridge on N. J. 24 is a 20-foot concrete pavement, built in 1922, with 5-foot shoulders, and has long been a bottleneck, with slow-moving trucks holding up traffic as they negotiate the curves and hills winding eastward from the bridge.

The new road from the Toll Bridge Plaza to the intersection of N. J. 24 with the connection from N. J. 28 will be a dual-lane highway of two 32-foot pavements separated by a parkway varying in width from 16 to 200 feet. The present 22-foot pavement of 8-inch uniform reinforced-concrete slab will be widened with a 12-foot base course of 8-inch plain concrete, and the entire area surfaced with bituminous concrete, to serve as one half of the divided highway. The old concrete cannot be completely utilized in this way, however, as some sections must be removed where the pavement was laid on a poor sub-base, or where short sight distances prevail on the summits of vertical curves. The other half of the dual highway will be a 10-inch uniform reinforced-concrete slab 32 feet wide with a 12-inch sand and gravel sub-base.

Grading Operations

Grading on the 1.6-mile approach was started by the contractor on October 9, 1944. An excess of material was a distinguishing feature of this job, as grades were lowered on the old road and the new section was mostly through cut. Surplus material was wasted along the river front about a mile from the west end of the project. The dolomitic limestone formation in the rock cuts yielded grudgingly to the drills and dynamite, and made progress in these sections rather slow.

The earth excavation was dealt with first in order to complete most of this before the winter frost hardened the ground. The eastern half of the job was mostly in a loamy soil which was easily moved by two LeTourneau 16-yard Carryall scrapers pulled by Caterpillar D8 tractors, with hauls averaging from 1,000 to 1,500 feet. By the end of November practically all the earth excavation had been completed, so that the winter months could be devoted to taking out the rock with shovels after the preliminary blasting.

In fill sections the earth was deposited by the scrapers and spread in 12-inch layers by an Allis-Chalmers HD-10 tractor with bulldozer, and compacted first by an American Steel Works double-drum sheepsfoot roller and then by a 10-ton 3-wheel Buffalo-Springfield roller.

The existing concrete was removed at the summit of vertical curves where the grade was lowered 2 feet to increase the sight distance which in New Jersey is required to be 450 feet on dual highways and 1,250 feet on single highways. When the existing road was built, requirements were not so rigid in this respect. Another location where the pavement was torn out was at the site of an old quarry that had been used as a town dump for 65 years. The road had been built over a deep deposit of garbage and ashes used to fill in the abandoned quarry. This hole yielded about 36,000 cubic yards of refuse material and had to be backfilled to a depth of 18 feet with rock covered with dirt.

Rock Excavation

The 29,524 cubic yards of rock excavation on this job sometimes occurred in formations 20 feet high which had to be blasted. Two Ingersoll-Rand portable compressors furnished air at 100-pounds pressure for two Ingersoll-Rand wagon drills using 1¼-inch steel from 6 to 24 feet long. The drill holes were charged with from six to ten sticks of Hercules Extra dynamite of 40 per cent strength and the holes then were tamped with sand in 1 x 12-inch paper cylinders. The area to be blasted was covered with a 12-foot-square woven-wire mat weighing 2 tons to keep the rock fragments from

(*Continued on next page*)

C. & E. M. Photo

An Ingersoll-Rand wagon drill works in horizontal position to speed drilling of the lift holes for blasting ledge rock on the Easton-Phillipsburg Bridge approach highway.

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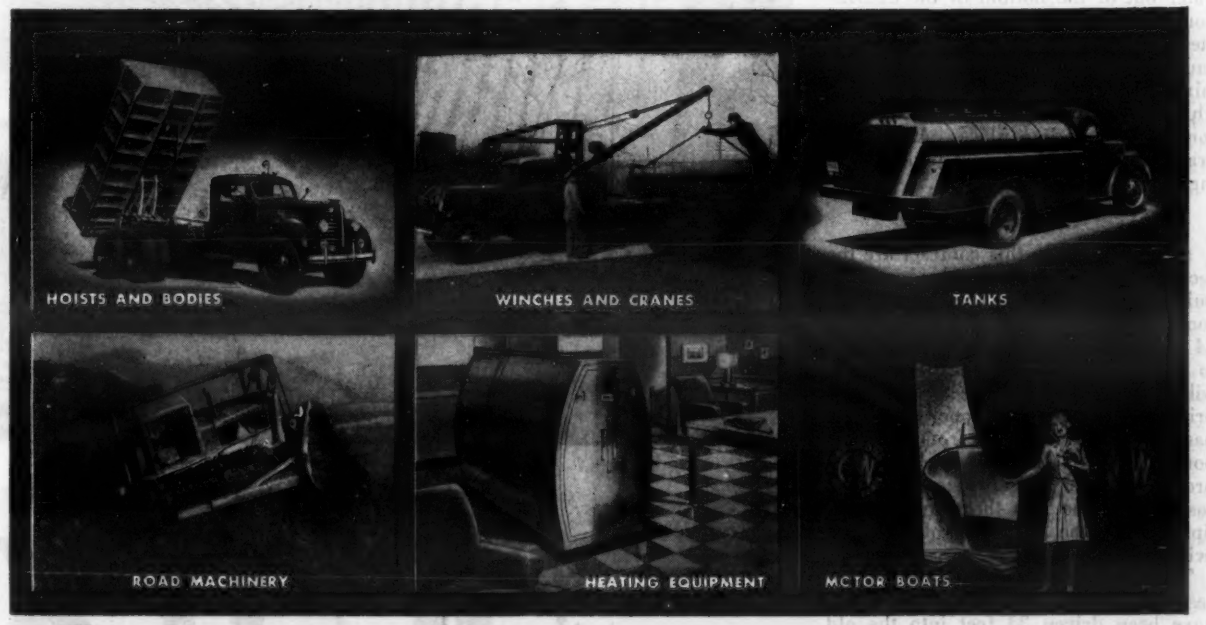

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DETROIT 11, MICH. WORLD'S LARGEST MANUFACTURERS OF TRUCK AND TRAILER EQUIPMENT

Dirt and Rock Moved For N. J. Dual Route

(*Continued from preceding page*)

flying. The Northwest 1¾-yard shovel working in the cut handled the mat and removed the broken rock. The material was loaded into a fleet of four trucks, two Macks, one International and one Chevrolet, carrying from 3 to 5 yards and hauled either to where fill was required or to the waste area along the river. The limit of haul for the road sections was short, with a maximum of 1,500 feet.

Drainage

Because of the hilly nature of the country, a large quantity of storm-sewer pipe to handle the run-off was placed beneath the parkway in the center of the highway. The reinforced-concrete pipe increases in size from 12 inches at the eastern end to 66 inches at the western end at the Toll Bridge Plaza where the water is carried over 1,000 feet to the Delaware River. Two Northwest ¾-yard Pullshovels dug the pipe trenches which averaged about 7 feet deep and up to 7 feet wide. Pipe up to and including 18 inches in diameter was laid by hand, but sizes above that were placed in the trench by the Pullshovels. Pipe was also set by a Northwest truck crane with a 30-foot boom on the end of which was a cable and pipe hook. The pipe came in 4-foot lengths and the joints were sealed with cement.

A new concrete box culvert, 5 feet wide x 4 feet high x 130 feet long, was built to replace a similar 5 x 2-foot culvert which extended 45 feet under the old road. The new culvert was built for half length before the fill was placed over the new section of the road in the fall of 1944. In the spring, the old culvert will be removed and the new culvert completed. Footings for the culvert are of plain concrete 4 feet wide x 2 feet deep and support gravity side walls 4 feet high x 1 foot thick at the top and 3 feet at the bottom. The floor is 9 inches and the reinforced roof 12 inches thick.

Forms for the culvert concrete were made from 5 x ¾-inch tongue-and-groove boards backed by 2 x 4-inch studs spaced at 1-foot centers and built into 5 x 5-foot panels. These panels were held in place by 2 x 6-inch wales running along the bottom and top. The inside of the culvert forms was faced with ½-inch plywood. While the footings and gravity side walls were being poured, a Carter 2-inch pump was used to keep water out of the bottom of the excavation. Truck-mixed concrete from the Steckels Sand Co. in Phillipsburg was hauled the 2-mile distance in two truck-mixers, dumped into concrete buggies which were wheeled to the forms, and the concrete chuted into place. A Mall vibrator was used to prevent honeycombing.

Bridges

Also included in this contract are the reconstruction of one bridge and the building of another. The existing 16-foot-wide bridge which leads from N. J. 24 over the tracks of the D. L. & W. R. R. to the plant of the Ingersoll-Rand Co. will be widened to 22 feet. The new bridge is a reinforced-concrete underpass which carries traffic from the westbound lane of the new highway approaching the toll bridge over the east-bound lane into the town of Phillipsburg in the direction of the free bridge.

The west abutment of this bridge will rest on 155 12-inch treated piles which have been driven 34 feet into the old quarry dump. The other abutment will rest on solid rock at the edge of the quarry. Construction of this bridge is proceeding through the winter and will be completed next spring. The structure will be built on a skew of 63 degrees 23 minutes and will have a span of 48 feet 6 inches face-to-face of abutments with 14 feet vertical clearance. The footing for the abutment resting on piles is 14 feet 9 inches wide and 4 feet 9 inches deep, while the footing on rock is 13 feet 3 inches wide and of varying depth. The abutments are 40 feet long and the wing walls 35 feet. The superstructure is an 8½-inch reinforced-concrete slab supported by seven reinforced-concrete beams 1 foot 10 inches wide.

C. & E. M. Photo

Foundation piles for the west abutment of the underpass in the new approach highway to the Easton, Pa.,-Phillipsburg, N. J., Bridge were driven 34 feet into an old town dump. Fred Berlanti & Son of Harrison, N. Y., has the contract for this project.

Cost, Quantities and Personnel

At the time of the grading, 43 men were employed on this contract, with 11 in administrative posts such as foremen, timekeepers, etc.; 12 in skilled positions such as tractor and shovel operators, carpenters, etc.; 18 in intermediate posts such as pipe-layers, drillers, truck drivers, etc.; and only 2 unskilled laborers. The shortage of unskilled labor is one of the big problems of the contractor.

The bid price of the contract, including the bridge construction, is $699,047 with $69,797 being the cost of the bridges. The contract allows 140 working days for its completion, but as the five-day week is recognized and the period from December 15 to May 1 is not

(*Concluded on next page*)

Dirt and Rock Moved For N. J. Dual Route

(*Continued from preceding page*)

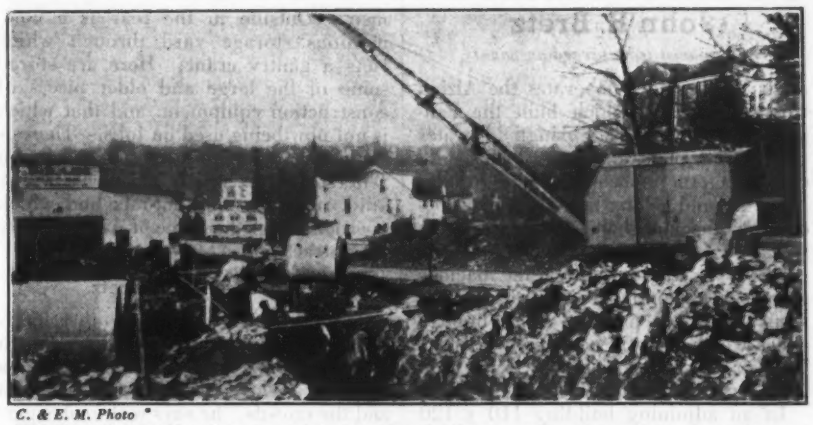
considered suitable to be charged against working days, the paving will probably not be completed before October, 1945. At present this is the only highway contract of any size in progress in New Jersey.

The major quantities, according to the engineers' estimate, are:

Roadway Items	Amount
Earth excavation	77,916 cu. yds.
Rock excavation	34,000 cu. yds.
Pavement removal, 8-inch concrete	15,600 sq. yds.
Bank-run gravel sub-base	18,000 cu. yds.
Concrete pavement, 10-inch	55,592 sq. yds.
Plain concrete, 8-inch base course	4,400 sq. yds.
Bituminous-concrete surface	2,583 tons
Reinforced-concrete culvert pipe, 12 to 66-inch	12,008 lin. ft.

Underpass Items	Amount
Foundation excavation	1,121 cu. yds.
Treated-timber piles	3,875 lin. ft.
Concrete	1,736 cu. yds.
Reinforcing steel	49,485 lbs.

Items for Bridge at Ingersoll-Rand Co.	Amount
Foundation excavation	560 cu. yds.
Concrete	440 cu. yds.
Reinforcing steel	19,500 lbs.



C. & E. M. Photo

Reinforced-concrete pipe was set in trenches in the central parkway to remove storm water on New Jersey's grading and paving contract at Phillipsburg. A Northwest truck crane is handling 48-inch-diameter sections with a pipe hook.

The 1.6-mile dual-highway approach to the Easton-Phillipsburg Bridge, SN-FAP 32A (4) and 32E (1), is being built by Fred Berlanti & Son, Inc., Harrison, N. Y., contractor, for whom John Dugan is Superintendent. The contract was awarded by the New Jersey State Highway Department, C. F. Bedwell, Acting State Highway Engineer. On this project, which is under the direction of H. D. Robbins, District Engineer, L. T. McCormick is Resident Engineer.

Story of the Career Of Contractor Bretz

(*Continued from page 7*)

paved with brick, first laying one course flat, then laying a top course standing on end. That old pavement held up too; in fact, it lasted until 1933 when we went back there and put down a new concrete pavement. Another job I take pride in was laying one of the first concrete roads in Illinois. That was in 1908 alongside the Illinois State Fair Grounds right here in Springfield."

When the Bretz Construction Co. became the Sangamo Construction Co. in 1925, one of its first jobs was the construction of a $1,000,000 sewer system for the Springfield Sanitary District. Since then the company has built all types of public works in the central Illinois area, including varied kinds of pavements, sewers, bridges, grade separations, etc. In 1942 it joined with the Hurden Construction Co. and Berenz & Son to build more than $1,000,000 of roads and structures for the Sangamon Ordnance Depot at Illiopolis, Ill.

"We'll build anything," said Bretz, in his enthusiastic, vigorous manner. "No job is too big or too small. If somebody wants a post hole dug, they just have to call us up. If we can't find a man to do it, I'll go out and dig the hole myself." And after one look at Bretz you know he really means it.

Aside from the satisfaction that comes from jobs well done, Bretz' greatest pride perhaps comes from a little card he carries around in his wallet showing him to be the first member of the Illinois Association of Municipal Contractors, which organization he founded. This is now the Illinois Contractors Association, a branch of the Associated General Contractors of America. The card was issued on March 10, 1908, and signed by himself as first president, with Orie T. Dunlap of Edwardsville as the first secretary of the organization.

A Look at the Future

"About the future and the post-war era? We have no special plans," said Bretz, puffing on a cigar. "Right now we are not going out of our way looking for work since it is almost impossible to get labor for construction jobs. They are all in war industry. We have a tough time finding men to keep a couple of our paving contracts going, to say nothing of the access roads and parking areas we are building for the Allis-Chalmers tractor plant here in Springfield. And that is war work too.

"I don't think you can plan too far ahead these days. I remember even after the last war how hard it was to get labor. In 1919 men who had become accustomed to the high salaries of war industry were reluctant to work on highway construction with the accompanying heavy work. We may have that situation duplicated soon again."

Personnel and Plant

Sangamo Construction Co. looks like a permanent institution in the solid red-brick building at 700 North MacArthur Boulevard. A lobby leads into the main office where William H. Kewley, spark plug and work horse of the firm, may be found between visits to construction sites. Kewley, a native of St. Louis, began as timekeeper and kept going along until he has become a member of the firm. He is a well-built man of 44 with curly brown hair and alert eyes. It is Bill Kewley who keeps Sangamo moving today.

In adjoining private offices are the other two members of the firm, Franklyn Nelch and big, ponderous John Mueth, Jr., also out of St. Louis. Nelch and Mueth, besides their contracting interests, own and operate their own grain and

(*Concluded on next page*)

Construction BACKLOG

HALTED by the war, construction on the 11,000-ft. Brooklyn-Battery Tunnel in New York City will be resumed when 790 tons of giant nuts and bolts—such as shown in inset—become available. The tunnel, still three years from completion, is only one project of a post-war construction backlog already estimated at over 15 billion dollars.

On every type of construction job—from tunnels to skyscrapers, from bridges to sewers—construction machinery performs more efficiently, requires fewer repairs when lubricated *effectively.* To more and more operators everywhere, this means Texaco.

Texaco Ursa Oil X★★ for Diesels and heavy-duty gasoline engines, for example, assures better compression and combustion, greater fuel economy and more power because special additives give this heavy-duty oil the valuable properties of detergency and dispersion. Its detergency keeps piston rings free and engine parts clean. Its dispersive ability holds deposit-forming materials in suspension until normal drain periods. *Ursa Oil X★★* protects alloy bearings and prevents scuffing of rings, pistons, cylinders.

For quieter-running, longer-lasting transmission and differential gears, use Texaco transmission and differential lubricants.

Texaco lubricants have proved so effective in service they are definitely preferred in many fields, a few of which are listed below.

Texaco Lubrication Engineering Service is available to you through more than 2300 Texaco distributing points in the 48 States.

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★More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

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FOR ALL CONTRACTORS' EQUIPMENT

METROPOLITAN OPERA BROADCASTS SATURDAY AFTERNOONS

The new Smith ½-bag tilting mixer.

Air-Cooled Engine For Tilting Mixers

A new ½-bag tilting mixer equipped with an air-cooled engine, high-tension magneto and simple rope starter has been announced by the T. L. Smith Co., 2857 N. 32nd St., Milwaukee 10, Wis. Power is transmitted to the drum drive shaft by means of a roller chain running at low speed on machine-cut sprockets, all enclosed in the engine house. The housing has a hinged cover which opens like the trunk of an automobile so that every part of the engine is easily accessible.

A new bulletin describing this Smith mixer may be obtained direct from the manufacturer by mentioning this illustrated news item.

Drive-Axle Differential Eliminates Wheel Spin

The Thornton automatic-locking differential, providing positive traction for truck wheels operating in deep mud, sand, snow, soft earth or over ice and slippery roads, is featured in two brochures just received. Spinning of one wheel while the other goes dead is reported to be eliminated, since the motor cannot drive either wheel faster than ring gear speed, thus providing safer and more efficient operation and longer life for tires.

Interchangeable with the standard four-pinion type, this Thornton automatic-locking differential requires no special tools or equipment for change-over and installation. Mechanical operation and application of the device, which operates whether the vehicle is traveling forward, backward or turning to left or right, are fully described and illustrated.

Copies of this literature may be secured upon request to Thornton Tandem Co., 8737-A Grinnell Ave., Detroit 13, Mich. Just mention this review.

BAILY CONCRETE VIBRATORS

PAVEMENT VIBRATORS

Three types: *Vibrating screed*, full-width, propelled by hand-operated winch and cable or pushed ahead by finishing machine. Gasoline power plant.

Tubular internal, extending entirely across slab, mounted in front of finisher. Gasoline or electric power plant with flexible shaft drive.

Vibrating pan, full-width, carried by two-wheeled trailer behind any standard finisher. Gasoline or electric power plant.

STRUCTURAL CONCRETE VIBRATORS

1, 3, and 4 H.P. gasoline, air-cooled, 4 cycle motors; flexible-shaft drive; interchangeable vibrator heads lubricated for life. Wheelbarrow carriers.

Pioneers in Concrete Vibrators

BAILY VIBRATOR CO.
1519 WOOD STREET PHILADELPHIA PA

John E. Bretz

(*Continued from preceding page*)

stock farms. Mueth operates the Alzina Construction Co. which built the Lanphier High School, Springfield water purification plant and other projects. A conference room occupies another office. Here, around a long table, the firm discusses policy and shapes the course of its work.

"Here is where I check the balance sheets each month," said Bretz with a wink at Kewley, "and also collect my pay check which Bill still gives me whether I work or not. But take a look at our shop right next to the office."

In an adjoining building 110 x 120 feet long with a brick front, corrugated metal sides and roof, and concrete floor are housed the Sangamo trucks and construction equipment. A section of this warehouse, 54 x 40 feet, is a machine shop equipped with an air compressor, grinders, drill press, power hack saws, lathes, welding outfits, and a blacksmith forge. At times Sangamo employs 200 men. Outside in the rear is a commodious storage yard through which runs a gantry crane. Here are stored some of the large and older pieces of construction equipment, and that which is not now being used on jobs. There is also an asphalt plant of 1-ton capacity on Jefferson Street which can turn out any kind of bituminous hot-mix and which operates under the name of Asphalt Sales & Contracting Co.

Back to John Bretz

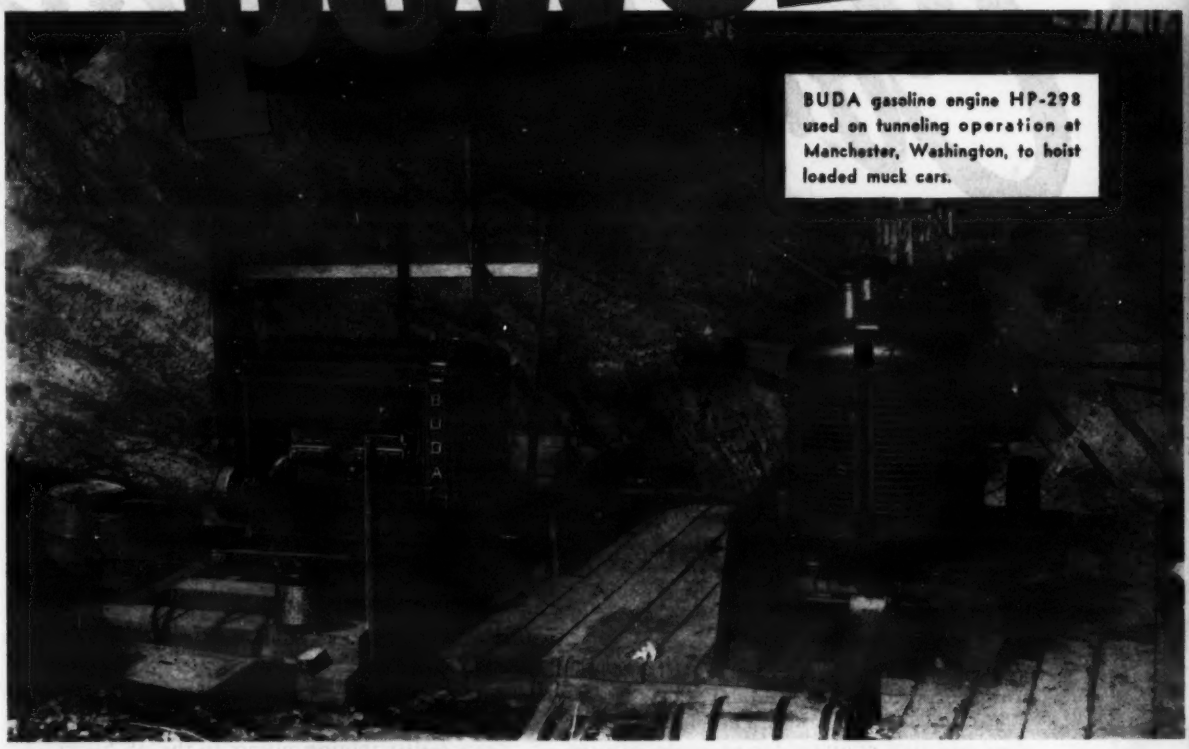
John Bretz, however, has other interests besides his work. For diversion in earlier years he raced a string of harness horses. "I loved the horses, the band and the crowds," he says with real eagerness, "but now I mostly loaf. My time is divided. Four months I spend here in Springfield, two in the spring and two in the fall. In the summer I go to my place up at Spring Lake, Michigan, while in the winter you can find me in Fort Myers, Florida.

"I've had some grand times in Springfield," he mused, "I have a lot of friends, some of whom have passed on. There was Vachel Lindsay. Lived right here at Fifth and Jackson Streets opposite the Governor's Mansion. I can still see him striding up and down our living-room floor reciting that strong ballad of his, 'The Congo'. My wife would accompany him on the piano as he, with his arms waving about, would half sing, half shout his 'boomlay, boomlay, boomlay boom'. We visited a lot back and forth. He left a wonderful wife when he died.

"But say, I have to stop. I'm due downtown."

Bretz piloted a Lincoln Zephyr smoothly through the downtown noonday traffic of Springfield and parked it parallel to the curb on the first attempt with skillful ease. "Couldn't do it again in a hundred tries," he modestly admitted. "Drop in when you're around again. I'll probably still be here. We live long in our family. Grandfather lived to be 100, but Dad died rather young at 85. Guess they will have to shoot the wife and me on Judgement Day! So long."

power...



BUDA gasoline engine HP-298 used on tunneling operation at Manchester, Washington, to hoist loaded muck cars.

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When dependable hoisting power is needed you can count on BUDA engines. Proved under all kinds of conditions on all types of jobs, BUDA has a reputation for giving longer, trouble-free performance — *More Horsepower Hours Per Dollar.* Write or wire for Bulletin.

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Illinois Road Group Urges Protection of Road Funds

At the organization meeting of the Illinois Good Roads Federation recently, a campaign was launched for the adoption of an amendment to the state constitution, dedicating all special motor-vehicle taxes solely to highway purposes. Joseph H. Braun, Secretary and General Counsel of the Chicago Motor Club, was named Chairman of the new organization, and Harry Robinson, Secretary of the Illinois Petroleum Industries Committee, was elected Secretary.

The campaign is opening with a drive to secure active support of all highway-user organizations in the state, and such groups are being urged to get on record for the proposed amendment through the adoption of appropriate resolutions. Reports indicate that during 1943 Illinois used $3,502,708 of its special highway taxes for non-highway purposes and that for the past ten years the state has been diverting more than 10 per cent of its highway revenues, the high point reaching 35 per cent in 1934.

In this move for an anti-diversion amendment to its state constitution, Illinois is following the lead of sixteen states who have already so protected their highway funds.

Unrationed Tires

All used and recapped passenger tires and all used and recapped industrial-type tires are now unrationed, the B. F. Goodrich Co.'s *Rubber News Letter* reports. However, all used and recapped truck tires are still rationed.

New passenger tire seconds and new all-reclaim tires are now classified as Grade I rather than Grade III tires.

HEIL Hi-Speed Cable Scoops give you extra speed on long hauls

This big 15-yard tractor scoop is push-loaded in 40 to 50 seconds — and hauls at travel speeds up to 20 miles per hour. The tilting floor gives positive mechanical push-out from the bowl and spreads load evenly. It's one of Heil's "bigger yardage at less cost" units that you will need in your post-war business. Write for bulletins today.

The full power of your tractor drives on the blade to move more "pay dirt"

Here is a rugged unit that is easily adjusted for an extra deep bite — whether in soft dirt or hard-packed clay — to give you a heaping load. And it is just as easy to adjust this unit for side-casting to right or left — to peel a bank — to grade or ditch — or to push straight ahead.

Heil Cable Dozers have the quality features that experienced operators demand: full vision ahead — fast, positive cable control with little effort — smooth action that is easy on the tractor — and less time out for adjustments and repairs. These famous features add up to "big loads" at less cost — and more profits for you.

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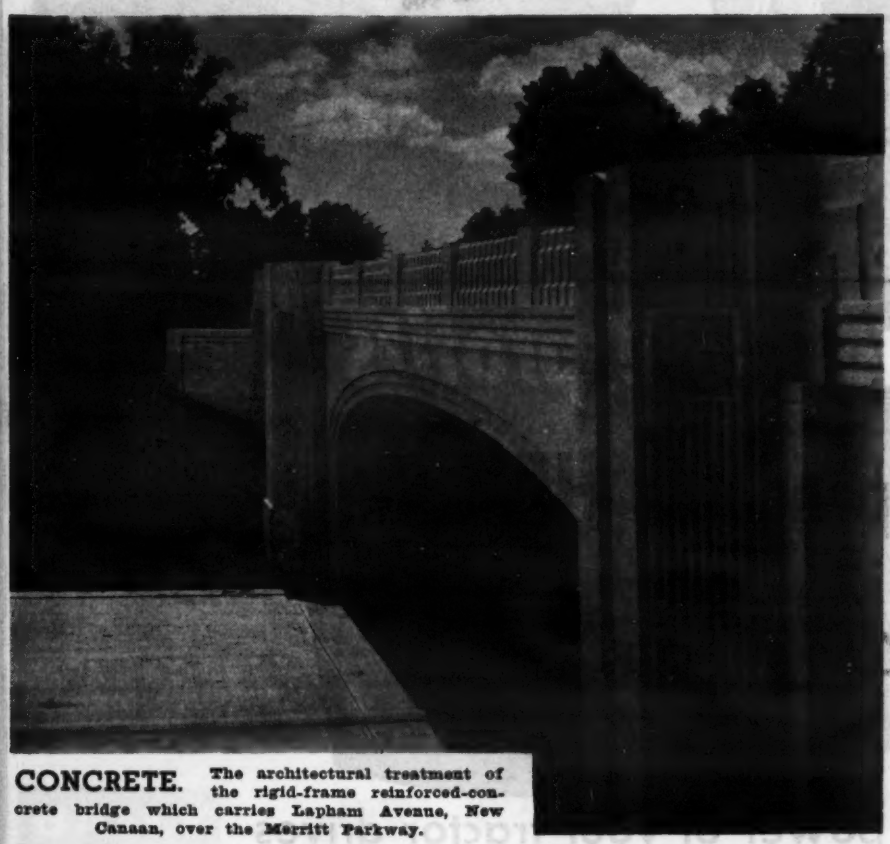
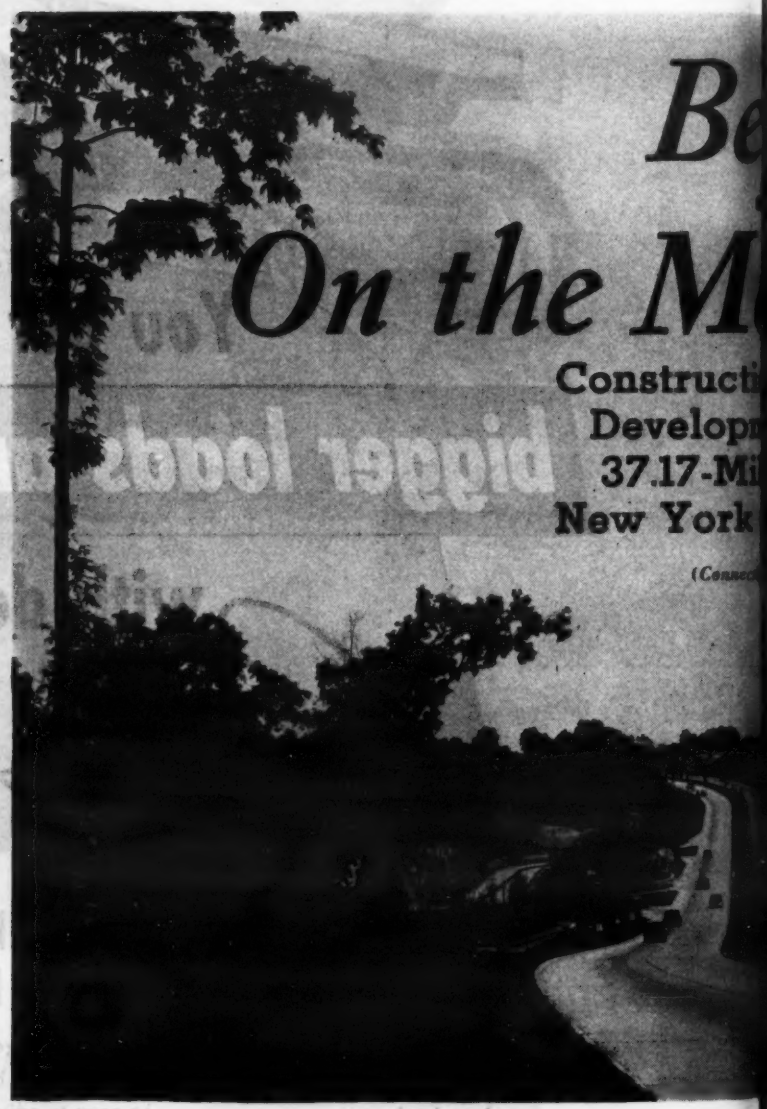
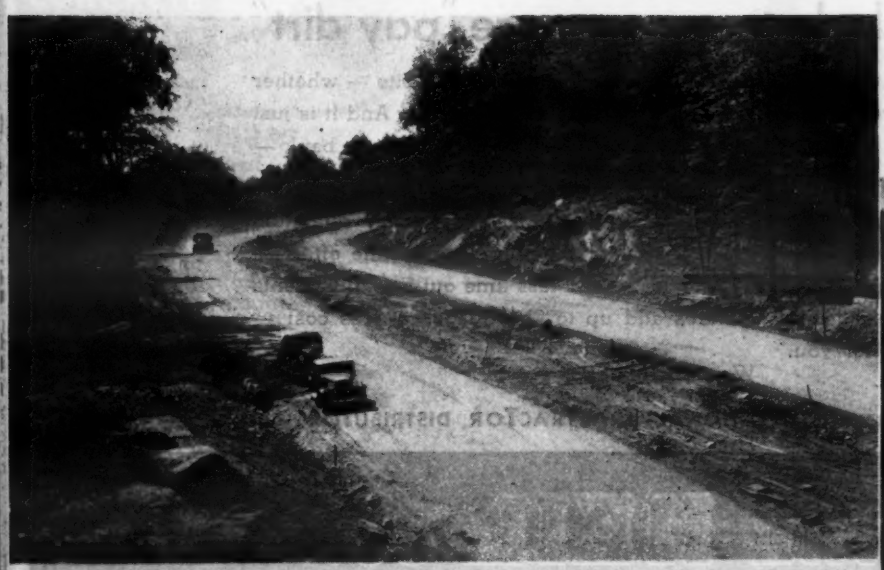
DRAINAGE. Typical drainage inlets on the Parkway to remove surface water. Hand-adzed creosote-treated native-oak guide rails may be seen on the outside of the curve.

"SPARE THAT TREE." Selective clearing was done ahead of grading to save specimen shade trees growing at the ... of the finished Parkway, both in the center strip and along the roadsides.



CONCRETE. The architectural treatment of the rigid-frame reinforced-concrete bridge which carries Lapham Avenue, New Canaan, over the Merritt Parkway.





ROCK OUTCROP. A rock outcrop 4,500 feet east of the New York State line becomes a feature of the new Merritt Parkway. The photo of the completed project, at the right, was taken before the cross-over through the center strip was eliminated, as it proved to be a traffic hazard.

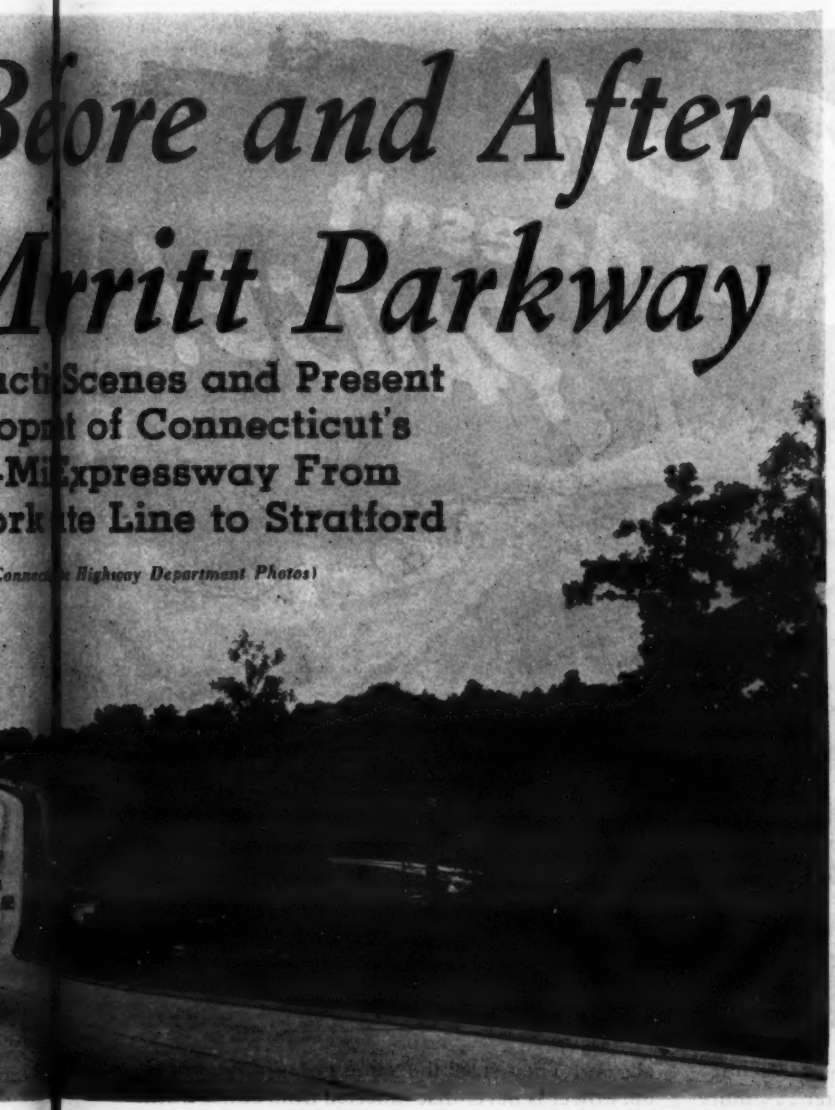
SNOW REMOVAL. After snow has been removed from the roadways of the Merritt Parkway, a wing plow pushes the snow further back on the roadsides to make room for later plowing.

STEEL BRIDGE. This plate-girder rigid-frame arch bridge carrying traffic over the Parkway frames a view of a natural wooded area in the middle ground and the planting of an area cleared of growth, in the foreground.

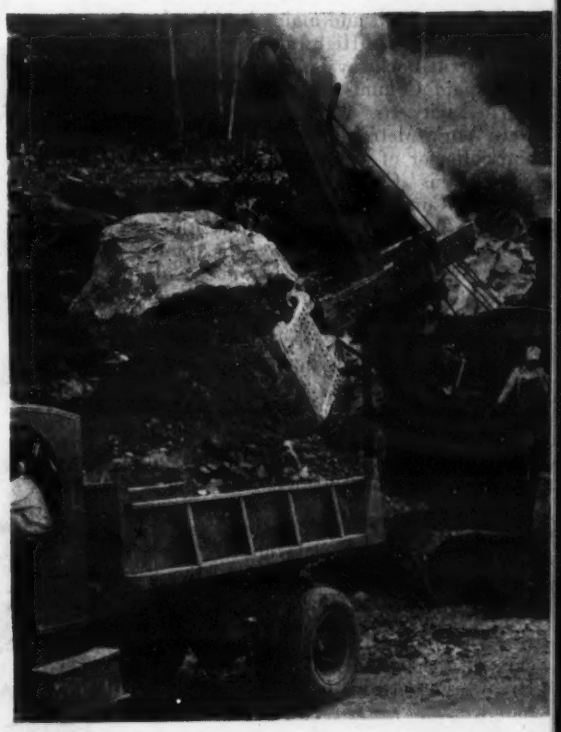
Before and After
Merritt Parkway

Scenes and Present Development of Connecticut's Limited-Mileage Expressway From New York State Line to Stratford

(Connecticut Highway Department Photos)



A BIG ONE. At right, extensive heavy rock excavation was necessary on some sections of the Merritt Parkway to avoid excessive grades and sharp curves.



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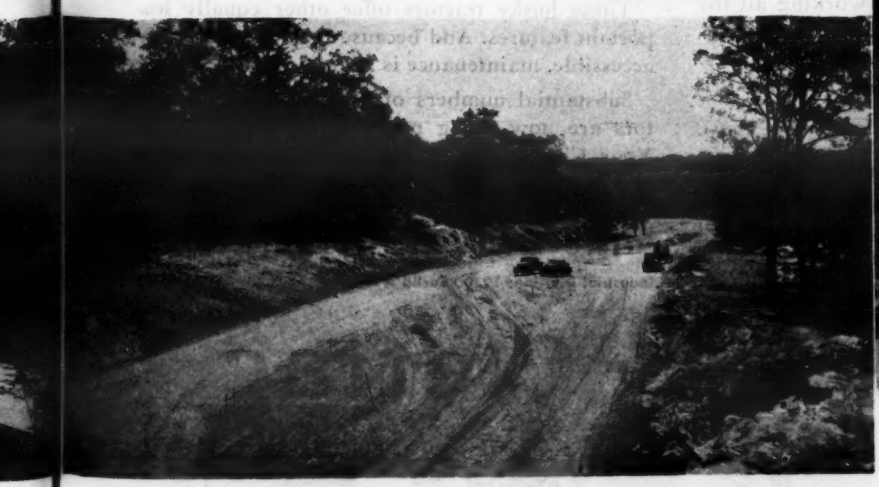
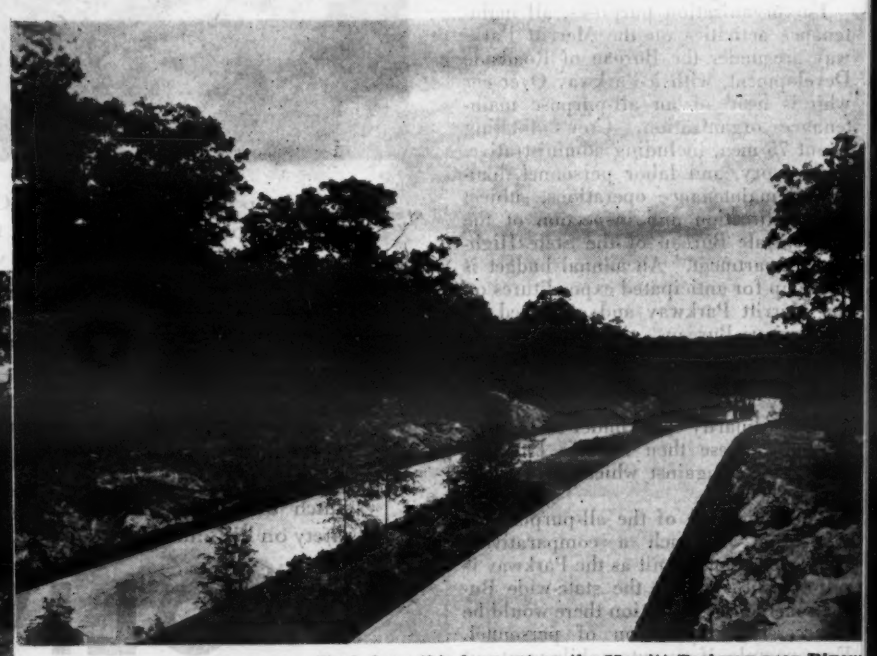
INTERCHANGE. The downgrade approach to the interchange at the crossing of U. S. 7 and the Merritt Parkway in the town of Norwalk is shown at the left.





THEN AND NOW. Rock from this long cut on the Merritt Parkway near Riverville Road in Greenwich was used to widen the fill at the curve in the background on a 3 to 1 slope. Three years later this fill had grown over as the new planting had become fully established (shown above).

Merritt Parkway

(*Continued from page 6*)

railroad bridge over the Parkway and one under.

The overhead highway bridges are mostly of rigid-frame construction of reinforced concrete, with a few of steel. In order to minimize the length of the overhead bridges on the older sections, the center strip was reduced from a grass plot 20 to 30 feet in width to a single concrete curb 12 inches wide and 6 inches high approaching and under the bridges. The railroad bridges all have a pier in the center strip to reduce the length of span.

The full length of the Parkway required 7,326,320 cubic yards of rock, earth, gravel, and muck excavation and the pouring of 290,600 cubic yards of concrete in pavement and structures. In addition to moving hundreds of trees and preserving many hundreds of others, 500,000 laurel plantings were made and 25,000 dogwood trees set out so that this Parkway is fast becoming renowned as a beauty spot of color.

Administration

Although built and maintained by the Connecticut State Highway Department, the Merritt Parkway is administered by an unpaid Commission of five public-spirited citizens, with James Melton, New York Metropolitan Opera tenor, and collector of automobiles of ancient vintage, as Chairman. The Merritt Parkway Commission has no jurisdiction over the finances of the Parkway, these being handled entirely by the State Highway Department. However, all contracts for gas-station leases and royalties on the Parkway are received by the Commission and are signed by the Chairman and also by the Commissioner of the State Highway Department and by the Commissioner of Finance and Control for the State of Connecticut.

The administration of maintenance on the Parkway is at considerable variance with the organization for the remainder of the state. State-wide maintenance is administered by several Bureaus, each under a Director. The Bureau of Roadway Maintenance is responsible for roadway surfaces, the Bureau of Roadside Development for the planting and care of roadsides, and the Division of Highway Control for installation and maintenance of direction and safety signs.

For organization purposes, all maintenance activities on the Merritt Parkway are under the Bureau of Roadside Development, with a Parkway Overseer who is head of an all-purpose maintenance organization. Crews totaling about 75 men, including administrative, supervisory, and labor personnel, handle all maintenance operations, subject to the direction and inspection of the appropriate Bureau of the State Highway Department. An annual budget is made up for anticipated expenditures on the Merritt Parkway and approved by the various Bureaus. When finally approved by the Highway Commissioner, the Bureaus issue service orders to the Parkway Overseer for the work which would ordinarily come under their jurisdiction. These then become Parkway budget items against which all work is charged.

The advantage of the all-purpose organization on such a comparatively small operational unit as the Parkway is self-evident. Under the state-wide Bureau method of operation there would be unnecessary duplication of personnel. For example, if an automobile went out of control, broke a guide rail, skinned a tree, and damaged a direction sign, it would require three separate crews to repair the damage, while the all-purpose organization requires but one crew to repair the guide rail, perform the necessary surgery on the tree, and straighten or replace the sign, but each part of the work is charged to its respective Bureau. During the past year such operations as bridge maintenance, pavement patching, filling joints and cracks, roadside planting and pruning, as well as building maintenance have been done by the 75-man organization.

Maintenance Organization

For maintenance purposes, the Merritt Parkway is divided into six zones varying in length from 5.5 to 9.3 miles. The length of the zones is determined largely by the available bridge cross-overs for turning snow-removal equipment and by existing truck storage facilities. Reserve trucks are shifted anywhere on the Parkway in winter where heavy drifts, mechanical breakdown, or other needs require their services. Similarly, mowing equipment is allocated in varying numbers among the six zones. Shifting from one zone to another is done to take care of breakdowns, drought, lush grass growth, etc. Under

(*Concluded on next page*)

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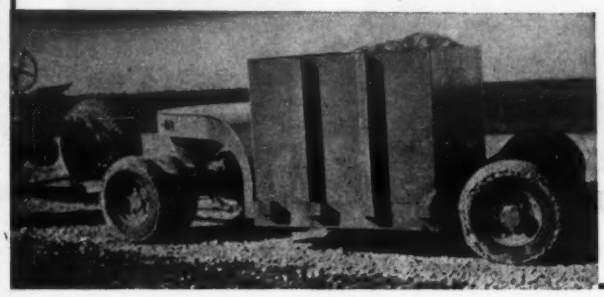

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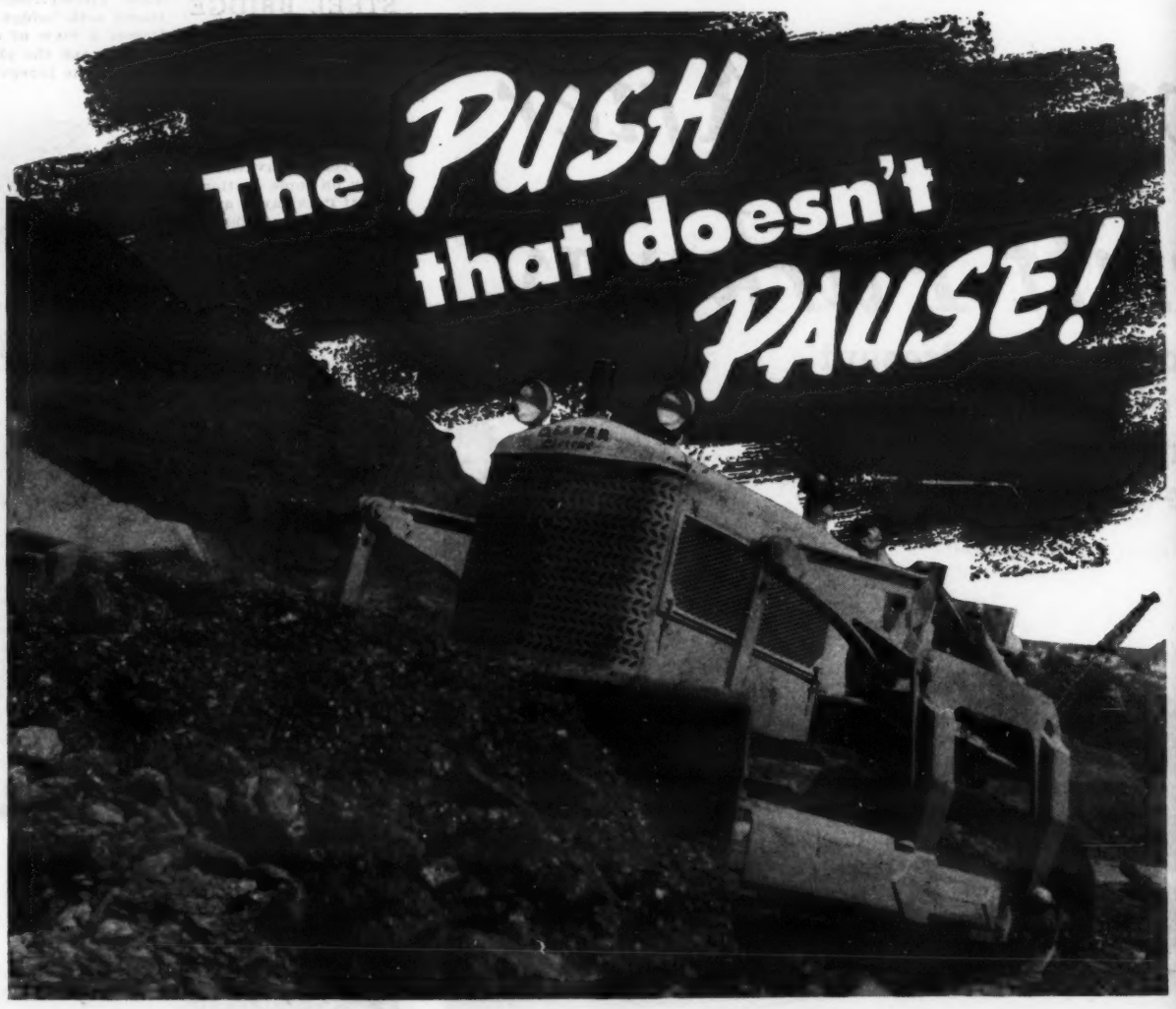

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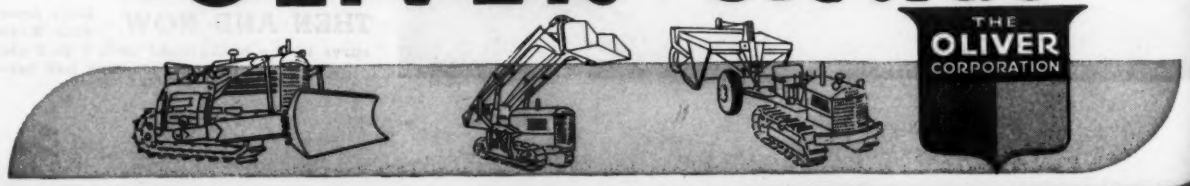

Merritt Parkway

(*Continued from preceding page*)

normal conditions the distribution of trucks with snow-plow and mowing equipment is as follows:

Zone 1, 5.5 miles long, extends from the New York State line at King Street, Port Chester, to North Street, Greenwich, and includes the westerly or Greenwich Toll Station Plaza, and the Greenwich gas station. Within this zone one all-wheel-drive Autocar truck, a 1½-ton Mack truck, a 3½-ton International truck, and a Case tractor are used. The mowing equipment includes a Gravely tractor and riding sulky, a Case tractor with a 5-foot sickle-bar cutter, one Coldwell hand mower for use at the Toll Station, and five Jacobsen motor scythes with 48-inch sickle bars.

Zone 2 is 8.7 miles long, from North Street to Darien Road, Conn. 29, in New Canaan. The motor-truck equipment in this zone includes an Autocar all-wheel-drive truck, a Mack and a White 6½-ton truck, and a GMC 3½-ton truck on reserve. The mowing equipment includes a Gravely tractor and sulky, a Coldwell hand mower, a National motor scythe, four Jacobsen motor scythes, and a Mead-Morrison crane mounted on an all-wheel-drive truck for general maintenance.

Zone 3, 8.5 miles in length, from Darien Road to Danbury Road, Conn. 57, in Westport, includes the New Canaan gas station. The motor-truck equipment in this zone consists of three GMC 6½-ton trucks with a reserve pool of an FWD 6½-ton truck and an International 3½-ton truck. The mowing and other maintenance equipment includes a Gravely tractor and sulky, a Silver King tractor with sickle bar, two Coldwell hand mowers, a National motor scythe, three Jacobsen motor scythes, and a Bean power sprayer with a 400-gallon tank.

Zone 4, 9.1 miles long from Danbury Road to Main Street, Trumbull, Conn. 25, includes the Fairfield gas station. The truck equipment for this zone consists of an Autocar all-wheel-drive truck, a Mack 6½-ton truck, and a GMC 3½-ton truck. The mowing and maintenance equipment includes a Gravely tractor and sulky, a Toro Bullet tractor with sickle bar, a Locke triplex reel cutter for use at the gas station, a Coldwell hand mower, and five Jacobsen motor scythes.

Zone 5, 9.3 miles long from Main Street to U.S. 1 at Milford, includes the Milford Parkway connection from the Toll Station to U.S. 1 and the Toll Station itself. The automotive equipment is composed of an Autocar all-wheel-drive truck, a White and a GMC 6½-ton truck, and in reserve an International 3½-ton truck. The mowing and maintenance equipment includes a Gravely tractor and riding sulky, a Toro Bullet Special with left and right-hand cutter bars, three Jacobsen motor scythes, and a Witte force-feed log saw.

Zone 6, 6.5 miles long, extends from the Toll Station at the east end of the Merritt Parkway along the Wilbur Cross Parkway to its connection with Conn. 34 to Derby, the present termination of the Wilbur Cross Parkway. This zone has the following automotive equipment: a Walter all-wheel-drive Snow Fighter, a Mack 6½-ton truck, an International 3½-ton truck, and one Case tractor at the Toll Station.

Each zone has its own garage for storing equipment, but the Zone 3 garage at New Canaan, on a plat contiguous to the New Canaan gas station, is the Administration Building, with far better and more extensive facilities for storage and servicing of equipment. The Greenwich maintenance station is a neat and clean structure built of discarded and salvaged guide rail; another was a barn on a large estate. All conform to the general construction in the vicinity and are shielded from the sight of traffic by virtue of their location, with the exception of the Greenwich station which is slated for post-war reconstruction.

The garage at the Merritt Parkway Administration Building in New Canaan, Conn., is built to permit trucks and snow plows to be stored in the same stall.

Snow Plowing

The heavy-duty all-wheel-drive trucks are equipped with either full V-plows or one-way Good Roads plows and wings, while the other trucks have only one-way plows. For clearing an average snowfall three trucks with one-way plows attached are run in echelon. The first plow runs close to the center curbing, moving the snow to the center of the road, the second plow moves this windrow towards the side and one of the all-wheel-drive trucks pushes it completely off the roadway. After the storm has ended, the top portion of the accumulated snow on the shoulder is moved back by a wing to provide space for plowing the next snowfall.

Personnel

The Merritt Parkway is administered jointly by the Merritt Parkway Commission, James Melton, Chairman, and the Connecticut State Highway Department, William J. Cox, Commissioner. The maintenance of the Parkway is under the direction of the Bureau of Roadside Development, John L. Wright, Director, with A. Earl Wood in charge, and C. R. Peterson as Parkway Overseer located in the Merritt Parkway Administration Building at New Canaan.

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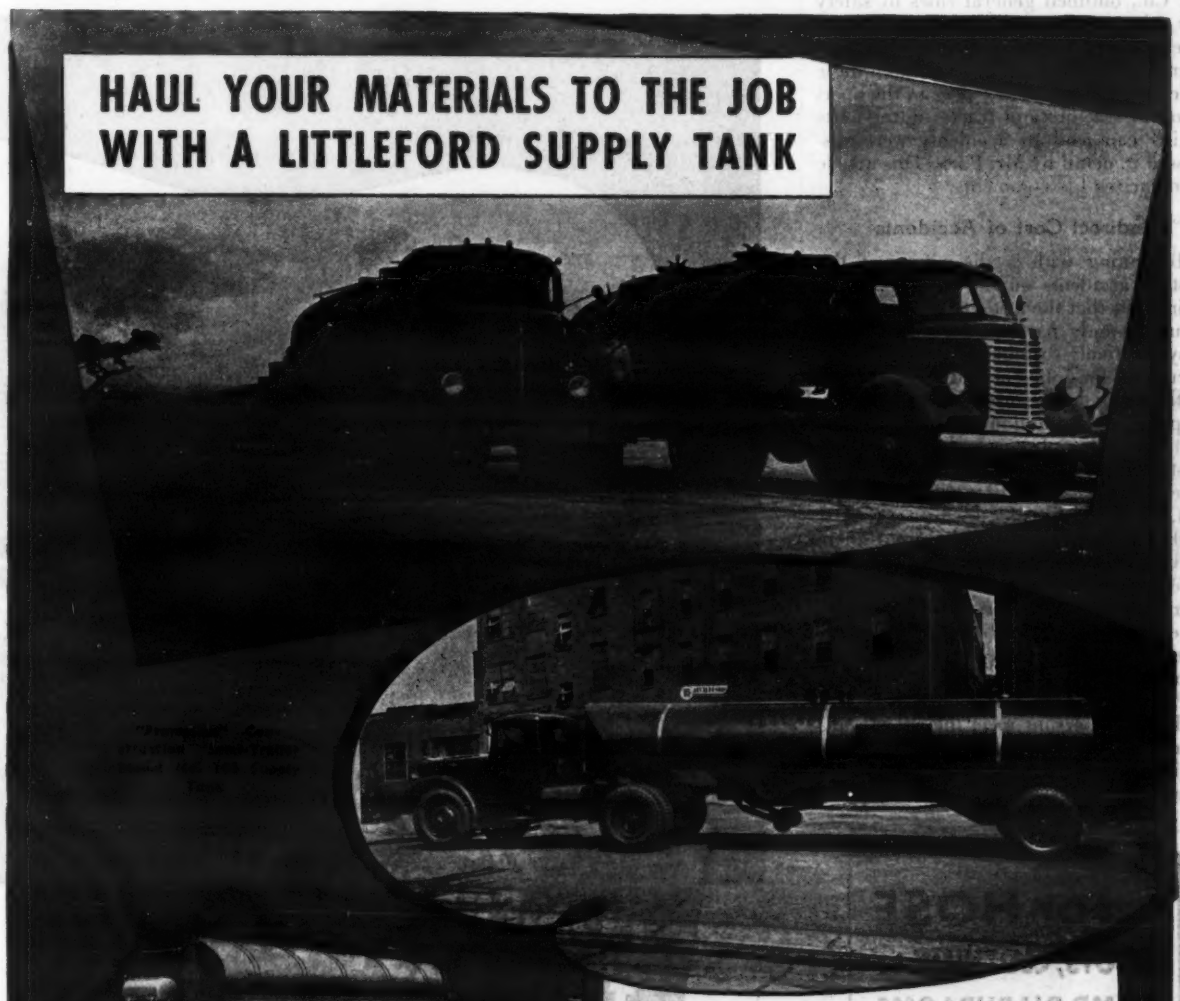

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Precautions Will Prevent Tractor-Dozer Accidents

Training and Supervision Of Operators in Safe Use Of Equipment Are Job Managers' Responsibility

+ ALTHOUGH in the field of industry in general the practice of safety engineering has become a profession, with constant efforts being made to apply to safety problems all obtainable skill and knowledge, the field of construction, and particularly that of excavation, is lagging far behind in accident-prevention plans and practices. Speaking before the 1944 National Safety Congress, Kenneth F. Park, Civil Engineer, Caterpillar Tractor Co., outlined general rules of safety for the earth-moving industry, and stressed the responsibility of management and supervision in seeing that these rules are followed. Practices in the operation of tractors and tractor-dozer units which can lead to accidents were discussed in detail by Mr. Park. This article summarizes his comments.

Indirect Cost of Accidents

Beginning with a discussion of the cost of accidents on the job, Mr. Park points out that the loss due to a personal injury is only part of the loss the employer actually sustains when an accident occurs on the job. The indirect loss, due to the excitement caused by an accident, stoppage of that and other work, and the temporary loss of morale, has been demonstrated to amount to several times the direct loss occasioned by the accident itself. It is not possible to insure against such collateral losses because of their nature. Insurance companies cannot enforce their safety recommendations; therefore their only recourse in the case of employers having frequent accidents is either to cancel the insurance or to "up" the rates.

Estimates show that between 16,000 and 19,000 persons meet their death annually as a result of occupational injuries of some kind. For 1943, 18,000 were reported, with 2,400 charged to construction. For the construction industry alone, this is more than the lives lost in the Johnstown Flood, and more than five times as many as died in the San Francisco earthquake and fire. Occupational injuries throughout industry during 1943 cost the nation $2,400,000,000, and statistics indicate that between 80 and 90 per cent of all industrial accidents are due to unsafe practices, while only 10 to 20 per cent are chargeable to unsafe conditions.

Management Must Help

Studies of industrial accident prevention show that the best results have been obtained in organizations where safety activities, both mechanical and educational, are considered as direct functions of supervision. The success of safety plans is dependent, in large part, upon the direct personal interest taken in this phase of operation by the chief executive or job manager.

A safety policy is a first essential. A means of actively conducting it is a second, while a system for obtaining reliable information relative to each accident and for tabulating and utilizing this material as a guide in planning for safety is equally important. These factors logically rest with management, although in the last analysis, the cause and prevention of accidents rest with the individual employee. It is thus essential that he be selected and placed with due consideration to his physical and mental abilities to perform his designated duties in a safe manner.

Education against accidents is necessary. The most efficient method seems to be provided by meetings to develop mutual interest between foremen and workers. Safety committees serve to place a definite responsibility for safety on its members, and if membership is rotated, such a system results in reaching an entire force and helps to convince them of the importance of any proposed measures. Leaflets and bulletins placed in prominent spots aid management in keeping the idea of safety in front of employees at all times.

On Excavating Jobs

In discussing safe practices specifically in the field of excavation, Mr. Park points out that the crawler tractor has always been an instrument of great power and weight, and its maximum use involves applying it in work of destruction or salvage, in spots where heavy things have to be lifted or pushed or pulled or dug up, turned over, or rolled, or in some manner moved around. For this reason, the tractor becomes a potential accident breeder.

The simple acts of getting on or off a tractor involve the chance of a slip or

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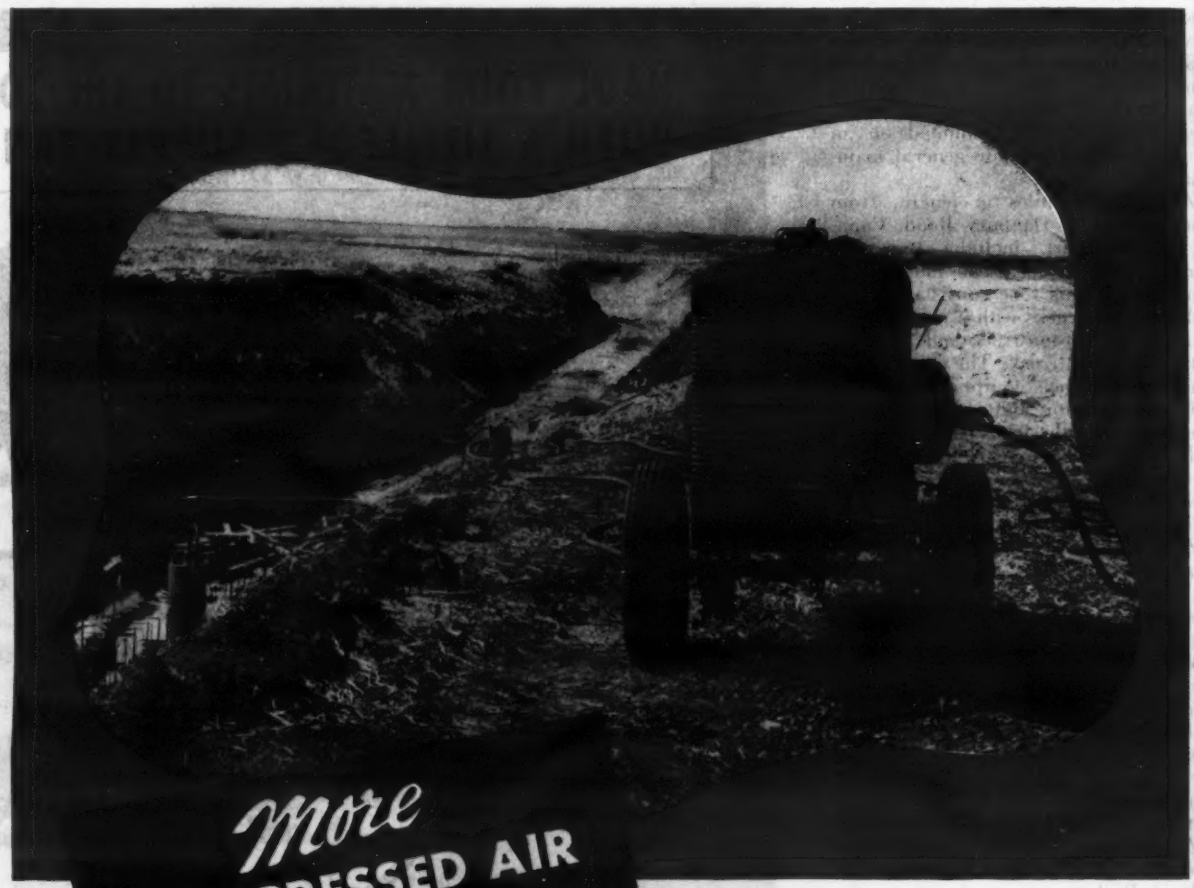

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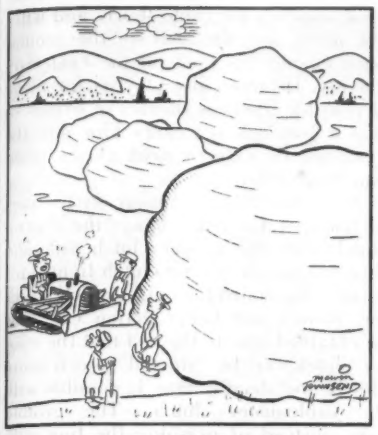

"Don't look at me!"

Tractor-Dozer Work Can Be Done Safely

(*Continued from preceding page*)

bruise and cannot be carelessly continued for long without chance of an accident. Mounting a tractor in motion is a particularly bad practice which should be banned. There should also be a ban on the use of iron-shod shoes, such as those with caulks or heel plates, because the danger of a severe or even fatal fall is very great. Of course fatal falls occur but seldom, in fact but once in any one man's life, but his employer and his widow and family find little comfort in this fact. So it pays to use care in mounting a tractor, which should be done by placing the left foot firmly on the step with the right hand grasping the mounting handle and the left on the seat to insure balance, and then raising oneself to the tracks. Special care should be taken if there is mud, snow or ice on the deck and tracks, and either the grease monkey or the operator should be designated to keep the deck and tracks clear of grease.

Before starting a tractor-bulldozer, the precautions of climbing on board, checking the transmission to assure its being out of gear, setting the brakes if on a slope, and seeing that the blade is dropped on the ground should all be insisted upon.

Starting a Tractor

Injuries in cranking a starting engine are in most part due to lack of knowledge in the use of magneto controls. When an engine is cold, the magneto control lever should be placed at advance. Seldom is danger occasioned from a kickback when the motor is cold, except from possible bruises occasioned by slips.

Never crank a starting engine with the thumb under the handle. Instead, place the left-hand fingers and thumb over the top of the handle. Pull the handle with the left hand over the top quarter of the turn; never push it through the bottom arc. A quarter turn is sufficient to crank the engine. Without these precautions, kickbacks from hot engines have resulted in scores of arm and hand injuries, breaks and bruises, all of which can be eliminated.

While cranking diesels with starting engines, the operator should be well balanced on his feet. After the diesel engine has been started, the gasoline tank valve under the hood has to be turned off. This should be done after the operator is on the tractor, rather than from the ground, to avoid the danger of accidental contact with the radiator fan. The use of gloves should be avoided in this operation.

Many of the smaller tractors are cranked by placing a knotted rope in a notch and winding around the flywheel. After neutralizing all controls, stand well balanced with the left hand braced against the fender over the track and give a steady, hard, quick pull of the rope with the right hand. The handle attached to the cranking rope should be held loosely enough in the fingers so that it will slip out of the hand if the starting engine backfires.

Safe Tractor Operation

We have now started a tractor and have the operator safely in his seat. All of his preliminary work and his mounting have been done on the left side of the machine. Before he starts, he should find out what is in front of him, on his right side, and behind him. Also, no one should ever ride on the tractor except on the seat.

There is little possibility of danger in tractor movement if the operator is awake, but operators have been known to fall asleep and wreck the machines and themselves. This can be avoided by supervision's laying a man off temporarily where there is evidence of extreme fatigue, illness, or drinking.

In general, bulldozer work is subject to accident to the operator alone, since so much of the work is an individual action. A safety measure well taken is to send operators out in pairs on isolated projects, or have an observer, or swamper, along in case of an accident.

In operation in the woods, the greatest danger lies in falling branches or timber. In general excavation, it is from falling material such as overhanging dirt and rocks or, in clearing, from falling branches. In either case, a heavy well supported arched steel mesh canopy will serve as a protection. Solid tops are primarily a protection from the elements and, of course, provide no visibility.

In pushing over large live trees, a dead branch or dead top is a hazard, and the only way to use a bulldozer is to cut the roots on three sides and slowly apply tractor power to the fourth side to push it out. Any abrupt contact with the butt of the tree may crack it in the middle, or break off a limb which will drop on the tractor. A completely dead large tree should not be pushed out with a dozer, but should be pulled out by means of a long cable. No dead snags should be left near pioneer roads where vibration or other means will dislodge them or expose workers to the danger of falling limbs.

When clearing, a dozer should work only in one direction in each area for the reason that, if a dozer knocks down a stand of small trees in one direction and then turns around and attacks them again from the opposite direction, his

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Tractor-Dozer Work Can Be Done Safely

(*Continued from preceding page*)

blade is not engaging with the butts of the trees but with their tops. As he pushes against the tops, the trees, if their roots are still caught in the ground, will bend in arcs like a hunting bow, then break and snap toward the operator. More than one worker has "jill poked" himself into the hospital by handling clearing in this manner.

Now a word about the man on the ground when coupling any piece of equipment to a tractor. It should be remembered that during this operation the tractor operator has the safety of the man on the ground entirely in his hands. He must back his tractor slowly and gently, in its slowest speed and at half throttle or less. The man on the ground must not attempt to guide the hitch block into the tractor drawbar jaw with his hands, but should use a stick or bar. Better still is a pebble or stick wedged into the hitch-block clevis to hold the hitch block in a horizontal position while the tractor backs into it. Then lift the tongue with a jack, and block the wheels so that the machine which is being coupled cannot move.

Working on Hillsides

On side-hill work the operator must know where the material he pushes over the edge is going. Another essential precaution is involved in turning on steep slopes. If the ground is covered with snow, pine needles, or rock, a turn on steep ground should be made only with the lower track against a solid stump, tree, or rock, to avoid sliding as the tractor comes around parallel to the hill. If possible, turns should be made with the operator on the up-hill side. Logging and pioneer skinners refer to the down-hill side of a tractor, or the side of a tractor next to the outside edge of a pioneer road, as the "hospital side", a very good definition.

Moving a tractor across a steep hillside entails the danger of sliding sideways. If this is necessary, carrying the dozer bowl low lowers the center of gravity and stabilizes the machine somewhat. Sliding in itself is not dangerous; it is the sudden stop which causes the damage. If a tractor sliding sideways encounters a solid rock or a stump, there is real danger of the machine rolling over. When a tractor is sliding sideways, there is only one thing to do and it must be done immediately. Lock the up-hill track with the brake, and turn the machine. Get one end or the other up the hill, as a tractor sliding end-to can be controlled, while a tractor sliding sideways can neither be controlled nor stopped.

In case it is necessary to ride the tractor down steep slopes, over which the tractor-dozer may start slipping, the blade can be used as a brake unless there is the possibility of ramming into a solid rock which may throw the tractor sideways into a roll, or lift it up and through the dozer arms, turning it over.

On level ground, a turn to the right is made by releasing the right clutch, and the left track walks the tractor around in that direction. On a steep slope, however, the release of the right clutch sends the tractor into a rapid turn to the left. This happens because the right track, freed of all contact with the engine, is forced by weight and gravity to spin free and thus throw the tractor into a "jack-knife". Men have been seriously injured because they forgot this characteristic of clutch-steered tractors.

Never leave a machine without dropping the bulldozer blade and locking the brake.

Safety in Cable Handling

When reeving cable on a drum or through sheaves, disengage the master clutch, idle the engine, and lock the brakes. Kill the engine before working with the cable on a front-mounted cable drum. Always kill the engine before attempting to tighten the master clutch, as a slip of the wrench will throw it into the flywheel.

Cable must be spooled after reeving it through the dozer to the control drum. The operator works the control and a helper leads the line to the drum. Many accidents have occurred in this operation, ranging from tearing "whiskered" line through the hands and lacerating them to drawing the hand under the line on the drum and crushing fingers or hand. Both men must use extra caution during this process. The tractor operator must wind on the cable slowly and without jerks, and the man on the ground must change his hold on the cable frequently. He must also stay as far away as possible from the sheaves or drums so that a jerk will not carry him into the machine. Be sure to wear gloves when handling cable.

A worthwhile precaution on the part of the operator is to engage the control clutch with the master clutch out, and then engage the master clutch lightly for turning the control drum. A much steadier, slower and better action can thus be obtained, due to the fact that the master clutch can be "slipped" much more slowly and steadily than is possible with the cable-drum clutch. The ground man, instead of grasping the line with his hands or with gloves or a rag, can straighten the line back as far from the tractor as possible, then throw the loop around a stick and, grasping the stick at each end, allow the cable to travel over it to the drum. Any jerk will merely take the stick out of his hands, thus eliminat-

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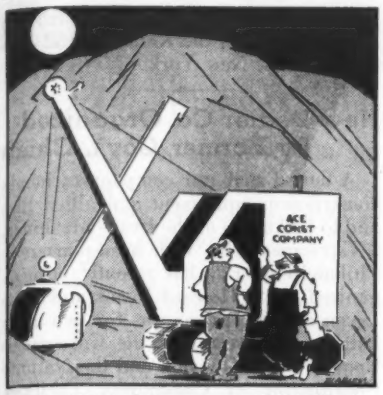

"Boy, did I pick up some dirt today!"

Tractor-Dozer Work Can Be Done Safely

(*Continued from preceding page*)

ing the possibility of burning, cutting, or other injuries.

Never crawl under a bulldozer blade to connect or disconnect a towing cable. Lay the cable on the ground, have the tractor operator straddle it and drop the blade, then climb over the blade to hook up, *after* the operator has taken the tractor out of gear.

Conclusion

In his discussion of this all-important subject of the reduction of accidents on construction jobs, Mr. Park states that the very nature of construction, and particularly of excavation, in which labor handles enormous quantities of power, wresting progress from nature itself, tends to make the nature of accidents more serious than those in which small tools and light equipment are used. The determination of the causes of accidents is a difficult task, but each accident is generally the culmination of a long train of events which is ultimately traceable to some failure of human foresight or insight. The lack of care, attention, or skill which underlies the occurrence of the great majority of accidents results from the combined action of numerous factors, one of the most important of which is inexperience. On the other hand, intimacy with danger on the part of workmen who know better often results in laxity in normal preventive measures.

Accidents can be prevented, but this can be accomplished only by the cooperative effort of management and supervision on the one hand and by the individual employees on the other.

Airfield Development Under Study by Army

Realizing that the increasing weight of military airplanes, and the consequent increasing cost and difficulty of airfield construction, will necessitate the continuation of pavement and other design studies on a large scale, the Chief of Engineers, U. S. Army, has established a Board of Consultants to advise his office on airfield and design problems, and has delegated specific functions in airfield development to various laboratories of the U. S. Engineer Department, civil works agency of the Corps of Engineers.

The Board of Consultants, composed of well known engineers in the fields of pavement design and soil mechanics, with the Chief of the Engineering and Development Division, Office of Chief of Engineers, as Chairman, is composed of the following members: H. M. Westergaard, Dean, Graduate School of Engineering, Harvard University; Arthur Casagrande, Associate Professor, Graduate School of Engineering, Harvard University; J. L. Land, Chief Engineer, Bureau of Materials and Tests, Alabama Highway Department; Fred C. Lang, Engineer of Materials and Research, Minnesota Highway Department, and Member, Executive Committee, Highway Research Board; O. J. Porter, Senior Engineer of Materials and Tests, California Division of Highways; and T. A. Middlebrooks, Civil Works Division, Office of Chief of Engineers.

The specific functions delegated to the Engineer Department laboratories in the airfield-development studies are: tests and investigations relating to bituminous pavements and underlying foundations will be made and coordinated by the Flexible Pavement Laboratory, which is part of the Embankment, Foundation and Pavement Division of the U. S. Waterways Experiment Station at Vicksburg, Miss.; tests and investigations relating to concrete pavements and underlying foundations will be carried out by the Rigid Pavement Laboratory, a part of the Cincinnati Testing Laboratory of the Engineer Department's Ohio River Division; while the Frost Effects Laboratory, which is part of the Soils Laboratory of the U. S. Engineer District Office, Boston, Mass., will coordinate tests and investigations relating to the behavior of subgrades and base courses subjected to frost action.

Lubrication Engineers Organize New Society

Lubrication engineers representing prominent industrial and transportation companies and educators have organized a non-profit body to be known as the American Society of Lubrication Engineers, with headquarters at 135 So. LaSalle St., Chicago, Ill. The membership consists of representatives of the educational field, machinery builders, lubricant suppliers, and consumers in various fields in industry. The aim of the organization will be "to promote the subject of lubrication in the various educational institutions to better prepare future members of industry for a more complete understanding of the operational problems to follow."

Officers of the American Society of Lubrication Engineers are: President, C. E. Pritchard, Republic Steel Co.; Vice President, J. C. Peebles, Dean of Engineering, Illinois Institute of Technology; Secretary and Treasurer, B. H. Jennings, Professor of Mechanical Engineering, Northwestern University. The directors include D. N. Evans, Inland Steel Co.; I. L. Harper, Lehigh Valley Railroad; and D. E. Whitehead, Carnegie-Illinois Steel Co.

Field Heads FWA Bureau

Announcement has been made by Major General Philip B. Fleming, Federal Works Administrator, of the appointment of George H. Field to the new post of Commissioner of Community Facilities. This new Bureau of Community Facilities has been set up to carry out the FWA programs of war public works and war public services. In addition to handling all matters pertaining to these programs, the Bureau will process applications for Federal aid to finance plans for post-war construction projects, under provisions of Title V of the War Mobilization and Reconversion Act.

The FWA Regional Offices will in the future be known as the Division Offices of the Bureau of Community Facilities of the Federal Works Agency.

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Official U. S. Army Photo
Wrecked bridges such as this dot the length of the Albert Canal in Belgium. U. S. Engineers are working to restore the bridges to service and clear the canal to carry supplies.

Army Engineers Help Clear Albert Canal

A U. S. Army Engineer General Service Regiment, working with Belgian and Dutch engineers, is helping to clear the Albert Canal which will be used to move great barge loads of supplies from Antwerp to Liege, Belgium. Realizing the importance of this waterway, the Nazis did not leave Belgium and Holland until cleverly placed demolitions had sent more than 200 highway and railway bridges crashing into the canal, as well as damaging the intricate locks. Stretching more than 100 miles from the great port of Antwerp, the Albert Canal was a great commercial waterway in peacetime and is a vital supply route in war.

To assist the Belgians and Dutch, already at work on their canal, the Engineers were assigned the task of raising and clearing damaged spans and building new ones with ample clearance for the barges. British engineers are clearing the section of the canal in their sector, but the Americans found the wreckage of more than 60 bridges, and two sets of damaged locks, in their section. Captured German equipment is helping to rebuild the bridges and locks, and none of the materials being used to construct new bridges is from the United States.

Steel girders are from a steel mill in Luxembourg, and piling and flooring from an Army forestry battalion in Belgium. It is reported that about 60 per cent of the cables and explosives were captured from the enemy. A shortage of some vital repair equipment has made operations more difficult. There are not enough American torches for welding and cutting, for example. They are using some French and Belgian torches but find them difficult to adapt to American oxygen and acetylene tanks.

Designs for the new spans across the canal are drawn at Headquarters by Master Sergeant Lief Gustafson of Woodbridge, N. J., who in civilian life was a designer for Burns & Roe, Inc., consulting engineers, New York City. "Naturally, I try to design a bridge which will take the least time to construct, but which will carry an adequate load, taking into consideration the materials available," Sgt. Gustafson said. "Many times I find we can utilize part of the wrecked structure, either by raising it into place, or by using it as an abutment for part of the new bridge. The adaptation of available material poses many new problems and results in rather a hodge-podge structure, considering it from normal standards, but they work, and that's the thing."

The canal ranges in depth from 16 to 98 feet, and offers some difficult problems in pile driving. In most spots, a hard formation has been found just beneath 5 feet of loose rock, while in other sections the floor of the canal has been covered with concrete, part of which must be removed before the piling can be driven.

New Stability Tests For Asphaltic Mixes

An extensive study of cut-back asphaltic mixes by A. W. Dow, Inc., of New York City has resulted in an interesting new test to determine how these mixes will act in the field. A conventional stripping test followed by a Hubbard field stability test of the same sample is advocated as closely paralleling the field conditions that the mix must withstand.

The results of this investigation and a detailed description of the test have been published in a 12-page leaflet which may be secured from the Kotal Co., 52 Vanderbilt Ave., New York 17, N. Y.

New Dealer Co. Organized By Former Gov't. Chiefs

A new distributor company to handle construction equipment and allied lines and to be known as the Evans Machinery & Equipment Co., with headquarters in Philadelphia, Pa., has recently been organized by S. Howard Evans and Louis Levenson. Mr. Evans was for two and a half years Director of the Government Requirements Division and the National Coordinator of Community Facilities. Mr. Levenson previously served with the War Production Board as Chief of the Maintenance Machinery Section, Government Projects, Equipment and Supplies Division of the Office of Civilian Requirements.

Among the manufacturers to be represented by the new company are J. I. Case Co., Galion Iron Works & Mfg. Co., and E. D. Etnyre & Co.

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Wisconsin Hot-Mix Laid Under Traffic

Old Concrete Pavement Serves As Base for Bituminous Top Near Racine, Wis.: Roadway Widened in Previous Season

+ A CONTRACT for the construction of a 2-inch tar hot-mix top on 6 miles of State Trunk Highway 20 west from Racine, Wis., to its junction with U. S. 41 was awarded by the State Highway Commission of Wisconsin in 1944 to Payne & Dolan of Wisconsin, Milwaukee, Wis. All work was performed under heavy traffic, and this fact was one of the primary reasons for specifying the use of a hot plant-mix, the placing of which would impede traffic less than road mixing.

The Hot-Mix Plant

For the erection of the mixing plant the contractor selected a site on the property of a commercial producer of crushed rock. This site, 3½ miles from the east end of the 6-mile job, provided an excellent layout, while the opportunity to switch cars of stone and screenings from the producer's plant with little delay eliminated the necessity for large stockpiles and incidental rehandling of aggregates. Small quantities of a fine sand needed to increase the percentage of fines in the mixture was truck-hauled in and stockpiled, while the other two aggregates were switched in gravel cars from the quarry and unloaded directly into a 30-ton 3-compartment steel bin by a P & H crane and clamshell. Discharge from the three gates of this bin directly into the cold elevator pit provided rough preliminary proportioning.

The Hetherington & Berner plant included the drier, equipped with a recording pyrometer, and a dust collector. The drier used fuel oil from an old railroad tank car of 8,000-gallon capacity, atomized by steam from the same 40-hp horizontal boiler which supplied steam to heat and pump the tar and operate the gate rams beneath the 2,500-pound-batch pugmill. An Allis-Chalmers 75-hp induction motor, set on a wood-block foundation in a shed nearby, drove the asphalt plant. A No. 4 vibrating screen at the top of the hot elevator separated the aggregates into two bins for proper proportioning in the batcher which was equipped with a Kron dial scale. Two 12,000-gallon steel tanks provided storage for the RT-11 tar, 5½ per cent of which was incorporated into the 225-degree mixture.

The weights of the various aggregates, with their screen sizes, in a 2,500-pound batch were as follows:

Material	Screen Sizes	Weight
Bin 1	½-inch to No. 4	1,181 lbs.
Bin 2	Below No. 4	1,182 lbs.
Tar		137 lbs.
	Total	2,500 lbs.

Laying the Hot-Mix

The surfacing was placed on an old 18-foot concrete pavement which had been widened to 22 feet the summer before by the addition of a bituminous material, mixed at a convenient location nearby by power graders, hauled in, placed in trenches excavated 2 feet wide and to the depth of the concrete pavement, and rolled.

Because of the heavy traffic, laying of the new surface course was conducted in the following manner: starting from the previous day's work which had been squared up across the road at the end of the day, the Barber-Greene Tamping-Leveling-Finisher placed an 11-foot lane up one side of the road for the first 2½ hours, from 8 to 10:30 a.m. At that time it was returned to the starting point and began placing the adjacent 11-foot lane up the other side, continuing for about 5 hours on that side. In the middle of the afternoon, it returned to the first lane and continued placing until that lane was even with the one on the opposite side.

The bituminous surfacing was laid in one single course 2 inches thick at a temperature of 200 degrees. So much mechanical stability resulted from the

(*Concluded on next page*)

205
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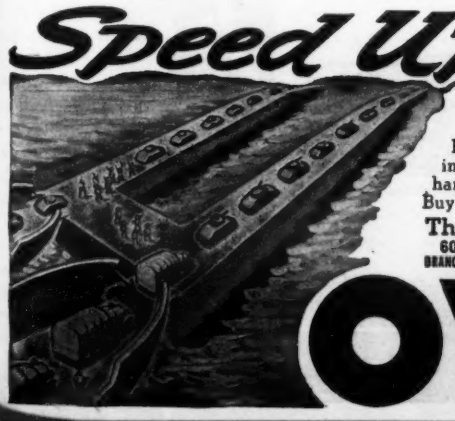

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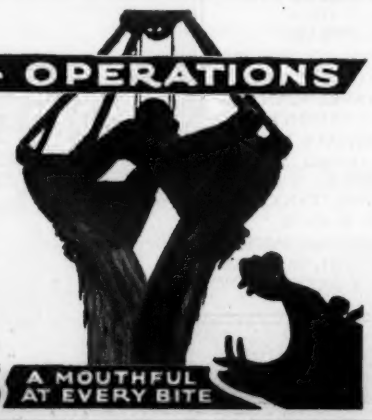

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Wisconsin Hot-Mix

(*Continued from preceding page*)

use of the angular limestone aggregate that the 8-ton tandem roller was able to roll almost up to the paver without waiting for any considerable reduction of temperature.

Personnel

The contract for this work was awarded to Payne & Dolan of Wisconsin, Milwaukee, Wis., by the State Highway Commission of Wisconsin. The bid price was $42,505 and 90 calendar days were allowed for completion. Harry Humphries was Superintendent for the contractor and Resident Engineer Mason Morris handled the job for the State Highway Commission, of which E. L. Roettiger is State Highway Engineer.

New Lima Dealers

The following distributors have been appointed by the Crane & Shovel Division, Lima Locomotive Works, Inc., Lima, Ohio, to handle the Lima line of shovels, draglines and cranes: Held-McCoy Machinery Co., 3201 Brighton Blvd., Denver 5, Colo., for the state of Colorado; Contractors' Equipment & Supply Co., Springer Bldg., Albuquerque, N. M., and Stanton St., El Paso, Texas, to cover New Mexico and western Texas; Interstate Machinery & Supply Co., 1006-10 Douglas St., Omaha 2, Nebr., whose territory will include Nebraska and western Iowa; Waterloo Construction Co., 524 Park Road, Waterloo, Iowa, for eastern Iowa; Phillippi-Murphy Equipment Co., 360 Hoover St., N. E., Minneapolis 13, Minn., covering a part of Minnesota and northwestern Wisconsin; and Smith Commercial Body Works, Inc., 1620 First Ave. N., Fargo, N. D., for eastern Montana, northwestern Minnesota and all of North Dakota.

March will be Red Cross Month. Give generously to the 1945 War Fund.

Helen Whitaker Leaves AASHO for New Position

After having served the American Association of State Highway Officials for twelve years, first as secretary to W. C. Markham, then upon his retirement as Acting Executive Secretary, and later as Assistant Executive Secretary, Helen Whitaker has resigned to accept a position as secretary to Hon. Clyde R. Hoey, U. S. Senator from North Carolina. Previous to her affiliation with the AASHO, Miss Whitaker for a number of years was connected with the North Carolina State Highway Commission, during the chairmanship of Frank Page.

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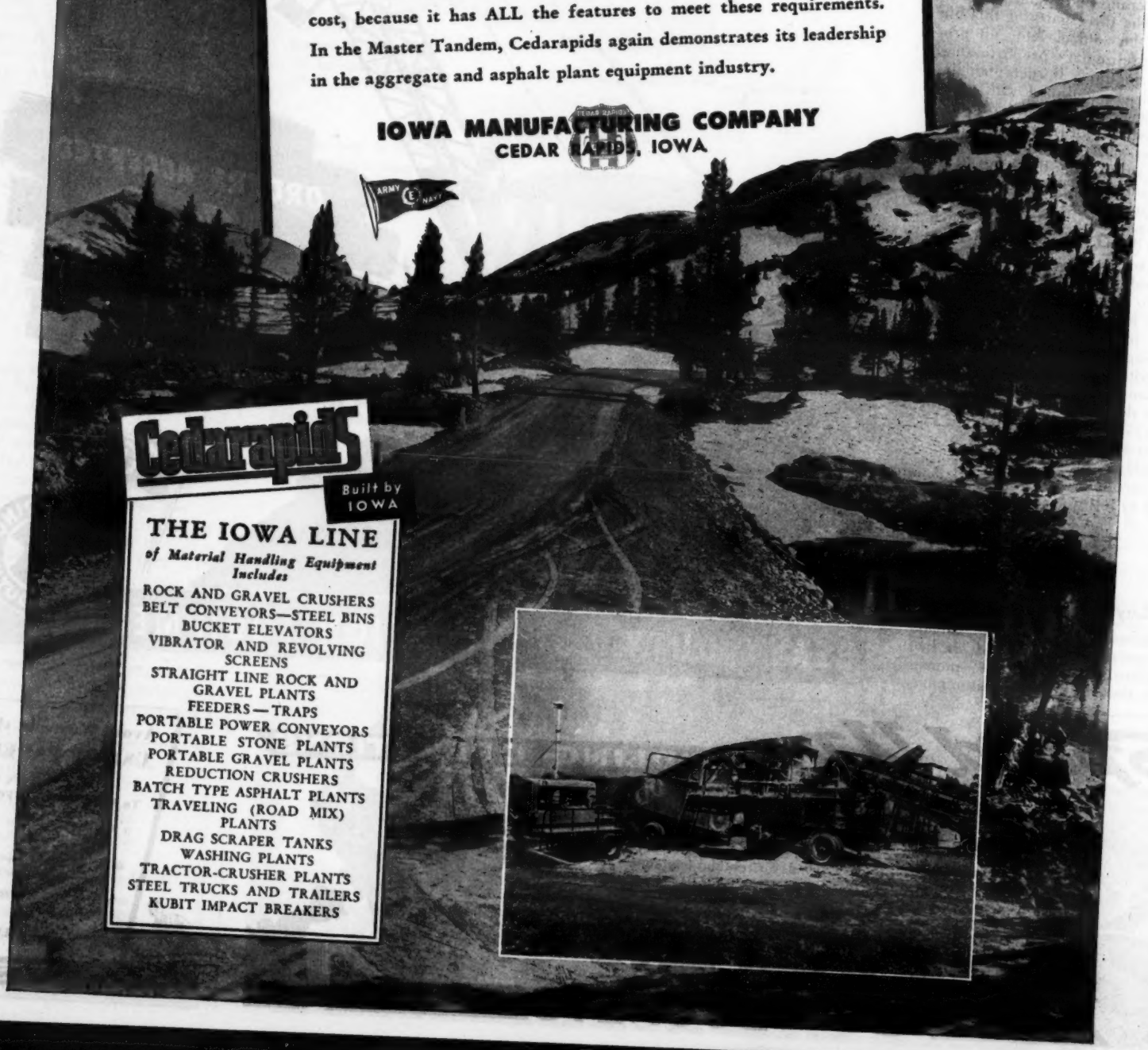

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DRAG SCRAPER TANKS
WASHING PLANTS
TRACTOR-CRUSHER PLANTS
STEEL TRUCKS AND TRAILERS
KUBIT IMPACT BREAKERS

ARBA Meeting

(*Continued from page* 1)

and concentrate on winning the war.

He said, "We are using some of our carefully accumulated reserves of military supplies and equipment faster than we can replace them. For the first time, there is a real threat that American production may fail our fighting forces. With our man-power situation at its most critical stage in our history, we are up against the most urgent and most difficult production assignment we have yet been called upon to fill."

Dramatizing the past productive effort of the construction industry, General Reybold said, "During the rush of the $11,000,000,000 war emergency construction program, we looked to you for many services, and you gave us your fullest cooperation. With your help, we have built, as a part of this vast program in this country, over 20,000 miles of roads on Army reservations. An additional 5,000 miles of access roads and 2,000 miles of strategic roads to military sites have been approved by the Army Engineers and built by the Public Roads Administration. We have built over 300,000,000 square yards of runways, taxiways, and aprons at over 1,000 Army airfields. Your equipment and methods were enlisted early in this military service. Your contractors and workmen did most of the construction. Your highway engineers and officials rendered invaluable service in cutting through the complexities of state and local regulations. Today I am happy to salute you for your monumental record of service."

Among those attending the meetings, contractors and manufacturers alike, the inevitable question was "When do you think we will have the next Road Show?". With the growth in size of construction equipment, there is a feeling that even the best of auditoriums where the Show has been held in the past may not have sufficient floor space and large enough doors to permit the entry of the big machines. Then, when the restrictions of travel are lifted, and the equipment-hungry contractors are first permitted to gaze on the new creations of construction equipment manufacturers, there will be a far greater demand for hotel space than has ever been known in the past. Out of all the discussion came the Utopian dream that the Show be held in the summer when the equipment could be exhibited outdoors under separate tents furnished as desired by the exhibitors, with a central pavilion for smaller exhibits and meetings. Then the housing problem might be taken care of by the local hotels plus a "Pullman City" such as has been used so effectively by the Shriners, American Legion and others, supplemented by boats along the river or lake front as required, or available. It is a topic of limitless possibilities.

Opening Session

The 42nd Annual Meeting was opened Tuesday morning by Charles M. Upham, Engineer-Director, with greetings to the membership and was followed by the report of the retiring President, Carl W. Brown, Chief Engineer, State Highway Department of Missouri, who has served two consecutive terms during the trying period of pending, and now completed, Federal-Aid legislation. Mr. Brown dramatized the stern realities of war and their impact on the highway industry with the statement, "Our state highway departments and the District of Columbia report nearly 20,000 men serving in every branch of the armed forces on every fighting front. Add to this appreciable number the tens of thousands of employees of member companies and organizations, and the total is increased many fold."

Following with an outline of the ARBA post-war program and how it has been received with great favor over the entire country, he said, "Congress has enacted a law and set up machinery for providing funds for post-war road building, but this does not constitute a program. It must be implemented by action on the part of all of us in the highway industry. It must take shape in the minds of highway engineers and on their drawing boards. We all know that it takes longer to plan a highway than it does to build one."

The officers of the Association and of the Contractors' and County Divisions were then announced by Engineer-Director Upham as follows:

Officers of the Association are: President, James J. Skelly, President, James J. Skelly Co., Media, Pa.; Vice President, Northeastern District, Paul B. Reinhold, President, Reinhold & Co., Inc., Pittsburgh, Pa.; Vice President, Southern District, W. A. Young, Cornell Young Co., Macon, Ga.; Vice President, Central District, E. R. Galvin, President, Tyson Bearing Corp., Massillon, Ohio; Vice President, Western District, C. H.

(*Continued on next page*)

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CONSTRUCTION MACHINERY

ARBA Meeting

(*Continued from preceding page*)

Purcell, Director, California Department of Public Works, Sacramento, Calif.; Treasurer, H. C. Whitehurst, Director of Highways, District of Columbia, Washington, D. C.; Directors, T. H. Cutler, Chief Engineer, Kentucky Department of Highways, Frankfort, Ky.; E. S. Gillette, Editor and Publisher, *Roads and Streets*, Chicago, Ill.; O. S. Hess, Engineer-Manager, Kent County Road Commission, Grand Rapids, Mich.; H. C. Hofheimer, II, President, Highway Contractors, Inc., Norfolk, Va.; Theodore Reed Kendall, Editor, CONTRACTORS AND ENGINEERS MONTHLY, New York, N. Y.; H. G. Sours, former Director, Ohio Department of Highways, Columbus, Ohio; Carl O. Wold, Vice President, Caterpillar Tractor Co., Peoria, Ill.

Officers of the Highway Contractors' Division are: President, Charles W. Smith, President, Smith Engineering & Construction Co., Pensacola, Fla.; Vice President, L. W. Edison, Contractor, Grand Rapids, Mich.; Directors: E. H. Hines, Contractor, Greenwood, S. C.; H. C. Hofheimer, II, President, Highway Contractors, Inc., Norfolk, Va.; C. V. Isbell, President, Isbell Construction Co., Reno, Nev.; Joseph Maney, President, C. J. Maney Co., Somerville, Mass.; W. J. Mann, Secretary-Treasurer, Carolina Road Builders' Association, Raleigh, N. C.; A. E. O'Brien, Executive Secretary, Associated Pennsylvania Constructors, Harrisburg, Pa.; E. J. Rainey, Vice President, S. J. Groves & Sons, Minneapolis, Minn.; A. J. Rayner, Executive Secretary, Virginia Road Builders Association, Richmond, Va. Directors at Large: K. L. Black, Luck & Black, Inc., Richmond, Va.; A. E. Bounsall, Contractor, Kenosha, Wis.; W. C. M. Butler, President, Central Pennsylvania Quarry Stripping & Construction Co., Hazelton, Pa.; Alex Hancock, President, Alex Hancock Construction Co., Mobile, Ala.; B. Howard Henderson, Vice President, Warren Bros. Road Co., Cambridge, Mass.; J. A. Jardine, Jardine Bridge Co., Fargo, N. D.; Carl G. Rose, President, Marion Contracting Co., Ocala, Fla.; Ford Sargent, President, Bridgeport Core Sand Co., Saginaw, Mich.; Polk Smartt, President, Polk Smartt Paving Co., Chattanooga, Tenn.; Nello L. Teer, Jr., President, Mecklenburg Construction Co., Durham, N. C.; Donald O. White, White Consolidated, Inc., Chicago, Ill.

Officers of the County Highway Officials' Division are: President, Arthur F. Ranney, County Engineer, Summit County, Akron, Ohio; Vice President, Northeastern District, F. Ray Williams, County Highway Superintendent, Saratoga County, Saratoga Springs, N. Y.; Vice President, Central District, Duncan M. Campbell, Chief Engineer, Cook County Highway Department, Chicago, Ill.; Vice President, Southern District, Ben. T. Collier, County Engineer, Coahoma County, Clarksdale, Miss.; Vice President, Western District, Paul B. Rynning, County Engineer, Jackson County, Medford, Ore.; Directors: Carl T. Bowen, County Engineer, Ottawa County, Grand Haven, Mich.; Walter C. Dye, County Superintendent of Highways, Vermilion County, Danville, Ill.; Walter A. King, Secretary, Kansas County Engineers Association, and County Engineer, Shawnee County, Topeka, Kans.; George W. Koronski, Superintendent and County Highway Engineer, Gogebic County, Bessemer, Mich.; D. W. Leonard, Chief Deputy Highway Engineer, Jackson County, Kansas City, Mo.; J. A. McCurdy, Association of County Commissioners of Georgia, Atlanta, Ga.; A. J. Thelan, Wisconsin County Boards Association, Madison, Wis.

The morning session closed with a talk by Jennings Randolph, Member, Committee on Expenditures in the Government Departments and long a member of the House Roads Committee, on the "Relationship of Industry and Government".

An invitation luncheon was served by Business Publishers International Corp., in the Tower Rooms of the Stevens Hotel, followed by colored motion pictures of the Inter-American Highway and a short, but very interesting, talk on the progress, service and future development of the highway by E. W. James, Chief of the Inter-American Regional Office of the Public Roads Administration. "Father of the Inter-American Highway".

Tuesday Afternoon Session

Hal G. Sours, former Director of the Ohio Department of Highways, presided at the afternoon session and announced that urgent legislative activities in Washington prevented Congressman William M. Whittington, ranking majority member, Committee on Roads, and Chairman, Committee on Flood Control, House of Representatives, from attending the meeting, and that Herman A. MacDonald, Massachusetts Commissioner of Public Works, and President of the American Association of State Highway Officials, was grounded in New York, unable to secure either air or rail transportation in time to reach the meeting.

In his short paper, which was read in his absence, Commissioner MacDonald called attention to the common partnership that has existed for so long between

(*Continued on next page*)

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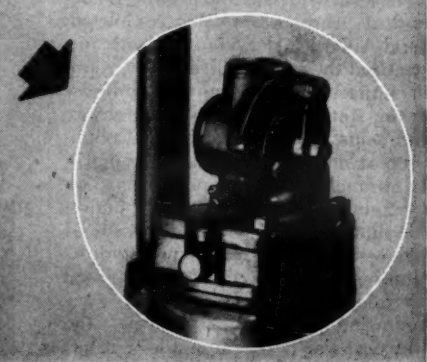

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ARBA Meeting

(*Continued from preceding page*)

the AASHO and the ARBA which insures a continuation of the American way of accomplishing results. With the Federal-Aid bill passed, Commissioner MacDonald pointed out that there are two steps now to be taken: (1) enactment by the separate states of legislation to meet the requirements of the Federal legislation, and (2) everlasting work on plans. He closed his paper by urging tolerance during the period of readjustment following the war, as such will be the only way of insuring the America of tomorrow towards which we all look.

Major General Philip B. Fleming, Administrator, Federal Works Agency, then addressed the meeting on "The Status of Public Works Planning", opening with the direct comment, "It cannot be said even today that we are adequately prepared [for post-war construction] and yet certain developments in the last few months have advanced us somewhat in the right direction. Of principal importance among these developments, I would cite the Federal-Aid Highway Act of 1944. Second, I would mention the War Mobilization and Reconversion Act of 1944 and, with reference to future public construction, Title V of that Act. Since progress in any direction requires first of all a knowledge of the relevant facts, I would also include the nation-wide survey of the status and volume of state and local public works planning made last summer by the Federal Works Agency for a special committee of the House of Representatives. The survey merely proved what already was generally suspected, that states and their political subdivisions had completed plans for a non-highway construction program inadequate to meet the post-war needs for public facilities, and equally inadequate to make any considerable contribution toward a solution of the employment problem or to assist in stabilizing the construction industry.

"The total volume of completed plans for state and Federal-Aid highway work is now sufficient for about $400,000,000 of construction. This, of course, is wholly inadequate if we are to have $1,000,000,000 of highway construction ready to start upon the cessation of hostilities. But, day by day, additional plans reach the completed stage, and with the additional stimulus afforded by the new Federal-Aid highway legislation of 1944, it is reasonable to expect that the states will be ready to let their contracts in the desired volume when the time comes.

"In my opinion, a total government investment in public works, Federal, state and local, of at least $5,000,000,000 annually in the immediate post-war years would be necessary to provide jobs and help to stabilize the construction industry.

"I arrived at that figure of $5,000,000,000 in this way: All construction, public and private, in normal times accounts for about 10 per cent of the total national product. And of the total construction volume a third has been public construction. Now, if we are to expect a total annual national product of $150,000,000,000 hereafter as the volume essential to provide something like full employment, we should also expect the volume of construction to rise to around $15,000,000,000 annually. Using the formula of one-third public to two-thirds private, we arrive at the figure of $5,000,000,000 as the share of the load which public works should carry.

"We have reason to hope that state and Federal-Aid highway construction will account for about $1,000,000,000 a year in the first post-war years. It is also reasonable to expect that direct Federal expenditures for reclamation, flood control, river and harbor work, public buildings and so on, will account for another $500,000,000. That gives us $1,500,000,000 of the desired public construction goal. Turning to the states, counties and cities, we know that they already have completed plans for about $1,000,000,000 of work. We also know that states, counties and municipalities have plans in some other stage of preparation, in the design stage, or the preliminary stage, or the idea stage, amounting to several additional billions. The problem is to get $2,500,000,000 more of non-highway state and local plans into the completed stage.

"I do not want to leave the impression that states and cities have on hand the funds needed to finance $2,500,000,000 of construction. Actually, we know, as a result of our survey, that they have on hand only about a third of the amount needed to finance the work for which plans *already* are completed. Almost two-thirds is neither in hand, arranged for, nor even under negotiation. The question of where the money is to come from to finance state and local construction is thus left unanswered, and I cannot sup-

(*Continued on next page*)

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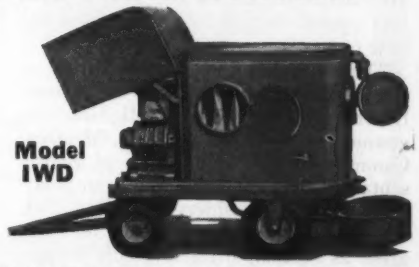

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WALTER
SNOW FIGHTERS

ARBA Meeting

(*Continued from preceding page*)

ply the answer. However, planning is the first essential, and we can only hope that if our planning is sound and our plans are completed, means for putting them into operation will be found when the time comes."

The afternoon session closed with an extemporaneous talk on "Maximum Benefits Call for Greater Highway Investments" by James W. Mott, Member, Committee on Roads, House of Representatives, in which he stated emphatically that he considers the 1944 Federal-Aid highway bill passed by the Congress as just an ordinary, only larger, biennial Federal-Aid bill, but still entirely inadequate for the needed postwar highway program. The major benefit of the bill is that it makes expenditures mandatory, and not according to the discretion of some bureaucratic agency. If the bill had been written permitting such agency discretion, he said, a far larger sum could have been included but the nation as a whole would not have benefited.

The Tuesday activities ended with another rousing "Old Timers" buffet supper, with music, singing and so-called acting under the indefatigable leadership of Old Timer Sam Beatty as Chairman and John A. Gaffey as President of the Old Timers.

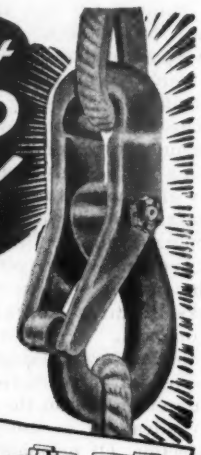
Wednesday Morning Session

With Wesley W. Polk, Chief Highway Engineer, Illinois Department of Public Works, presiding, the Wednesday morning session was opened by J. W. Robinson, Chairman, Committee on Roads, House of Representatives, discussing the topic, "The Groundwork Is Laid", during which he called attention to the fact that the new Federal-Aid highway bill is the largest appropriation ever made in any country for peacetime construction. He feels that this is only the beginning, that a start has been made by the Federal government, and now it is the responsibility of the forty-four state legislatures meeting this year to see that the proper bills are passed to enable the state highway departments to take full advantage of the Federal-Aid bill and also establish the required county and city relationships. He emphasized that the way to preserve state and local administrations and avoid Federal domination is for the state and local governments to realize that this bill gives them the opportunity to exercise their responsibilities. If they do not, an overall Federal agency may be developed to conduct all highway construction.

Congressman Robinson concluded his

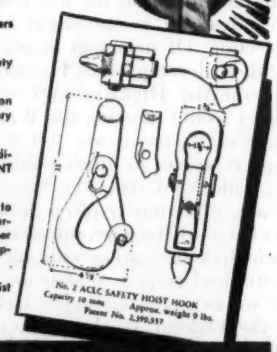
(*Continued on page 80*)

Not Merely Built-but ENGINEERED for UTMOST SAFETY!



Thousands of ACLC Safety Hoist Hooks are "going into service"—carrying heavier loads with utmost safety—at lower cost in time and equipment. The basic reason? ACLC Safety Hoist Hooks are not merely built—but ENGINEERED—geared to today's crying need for more efficiency. Note these features!

- ★ Patented construction provides true alignment of load and hoist;
- ★ Eliminates load slippage and hook straightening;
- ★ Load is evenly distributed between safety shoulders and lip, giving extra load carrying capacity;
- ★ Even shearing of pin would fail to dislodge load; safety shoulders and lip lock would still hold!
- ★ Scientifically designed to prevent snagging — on hatches, cornices, etc., a common fault in ordinary hooks;
- ★ Each size of ACLC Safety Hook replaces 4 sizes of ordinary hooks. Net result — SAVINGS in EQUIPMENT INVENTORY.
- ★ The ACLC Safety Hook is a forged unit designed to take maximum load with minimum metal and averages approximately 1 lb. of metal actual weight per ton load lift as against standard open hooks of approximately 4 to 5 lbs. of metal per ton load lift.
- ★ Despite all these exclusive advantages, the ACLC Hoist Hook costs far less than ordinary hooks.



Write for Descriptive Literature and Prices

American CHAIN LADDER Company Inc.
151 East 50th Street New York 22, N. Y.

ROTOBLADE SNOW PLOW

Rotoblade—The combination blade and rotary snow plow that accumulates and eliminates the snow in one operation. . . . It's NEW. . . . It's fast and reduces snow removal costs.

Airports—Rotoblade is the fastest plow on wheels. Does NOT create windrows or drift hazards. Costs less to buy and less to operate and maintain. Does the job in one third the time.

Highways—Rotoblade does the job better at about the same cost as a blade plow.

Snow Removal Equipment Co.
400 Seventh St. San Francisco, Calif.
THERE IS A DEALER NEAR YOU. WIRE US.

ROLLING RUNWAYS TO TOKYO!!

Vital to every advance on the road to Tokyo are the airfields with their runways made carpet-smooth with American equipment.

Prominent in the preparation of these runways are Buffalo Springfield rollers . . . the same rollers that will again serve in peacetime.

BUFFALO SPRINGFIELD ROLLERS
THE BUFFALO SPRINGFIELD ROLLER COMPANY
SPRINGFIELD, OHIO, U. S. A.

A U. S. elephant-trunk hose attached to a bottom-dump bucket placing concrete in a deep form.

New Elephant Trunk For Placing Concrete

The elephant-trunk chute for placing concrete in deep forms is standard practice because the articulated sections permit moving the chute around such obstacles as spacers, tie rods, and reinforcing. A new development in this device has been announced by the United States Rubber Co., 1230 Sixth Ave., New York 20, N. Y., in the U. S. elephant-trunk hose. As the hose, which comes in inside diameters from 4 to 20 inches, is flexible, it is more easily manipulated in the forms than the articulated sections of metal chute. The disadvantage of not being able to remove sections as the concrete pour rises is overcome by suspending the hose with a hopper from a bottom-dump concrete bucket swung by a boom, as shown in the illustration. The hopper shown is not part of the hose, but is clamped on with a friction band.

Further information as to availability, prices, etc., may be secured direct from the manufacturer by mentioning this illustrated news item.

New Victory Grader With New-Type Control

Featured by the use of four Hydromotors to control all blade movements, the new Victory model of the Warco grader is available in medium, heavy-duty and extra-heavy-duty sizes, with a power range of 31 to 68.5 hp. The manufacturer states that the Hydromotor is an improved application of hydraulic control to motor-grader operation, and differs from the usual ram or jack acting in a straight line in that the power is delivered through a rotor shaft rotating in an arc. There is only one moving part, operated by oil pressure in either direction, and action is claimed to be sensitive, smooth, and quick. Four of these Hydromotors control every movement of the grader blade, and the blade is automatically and securely locked in position when the controls are placed in neutral. A set of levers directly in front of the operator provides absolute easy finger-tip control and constant visibility of every detail of the work.

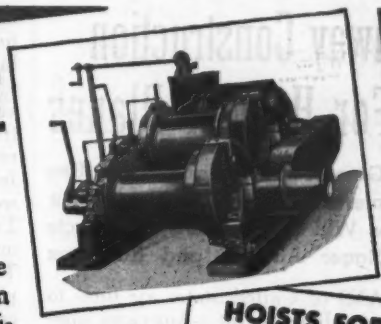
The medium-size model is powered by International gasoline or diesel engines, providing a power range from 31.5 to 41 hp, and has five forward speeds. The heavy-duty graders are equipped with Oliver Model 35 46-hp gasoline power units or with International full-diesel Model UD-9 engines, while the extra-heavy Warcos are powered by an Oliver Model 50 65-hp gasoline engine or by an International full-diesel UD-14 developing 68.5 hp. Overdrive transmissions are standard equipment on the heavy and extra-heavy models, affording eight forward speeds. Sturdy tandem drives are engineered in size and weight in relation to the horsepower and weight of the machine to insure maximum traction and driving force. Dual or single pneumatic-tired rear wheels can be furnished in place of the tandem drives on all models.

Further details and illustrations of the mechanical features of these new Victory Warco graders are contained in a 4-page folder, copies of which are yours for the asking. Direct your request to the W. A. Riddell Corp., Bucyrus, Ohio, and mention this item.

Westinghouse Names Hanna Associate Research Director

Clinton R. Hanna, inventor of the tank-gun stabilizer which enables Allied tanks to fire accurately while in motion, has been appointed an Associate Director of the Westinghouse Research Laboratory. Mr. Hanna has been associated with Westinghouse since 1922 and has inventions covered by more than eighty patents in the United States and foreign countries. For his work in the development of the tank-gun stabilizer, he was awarded a Presidential Citation in 1942.

Hoists to Fit the Job



Lidgerwood hoists have earned a 70-year reputation for dependability and efficiency *on the job*. There's a Lidgerwood gasoline, steam, electric or Diesel hoist to fit every construction need. When you need a hoist inquire *first* of LIDGERWOOD.

HOISTS FOR:
CABLEWAYS
INDUSTRIAL PLANTS
CONTRACTORS
MINES—DOCKS
RAILWAYS

LIDGERWOOD
ESTABLISHED 1873
Manufacturing Company
MAIN OFFICE AND WORKS • ELIZABETH, NEW JERSEY

CUT COSTS on ALL Lengths of Haul

Time saved in loading . . . on the haul road . . . and on the dump or fill . . . means more round trips per hour and more yards or tons moved per day. Rear-Dump and Bottom-Dump EUCLIDS are engineered for off-the-highway service and are economical on both short and long hauls.

Fast, easy loading by modern excavating equipment, coupled with Euclid speed and efficiency on the haul road, is the surest way to cut your hauling costs on all types of jobs. Your Euclid distributor or representative is at your service to provide information and to help with plans for your present or post-war hauling equipment.

A new pictorial booklet "Bottom-Dump EUCLIDS On The Move" is yours for the asking. Write for your copy of this interesting booklet today.

The EUCLID ROAD MACHINERY Co.
CLEVELAND 17, OHIO

EUCLID SELF-POWERED HAULING EQUIPMENT
For EARTH ROCK COAL ORE

Runway Construction For Heavier Planes

The Giant Planes Planned for Use On Inter-American Commercial Air Routes Will Require Early Contracts For Bigger Airports and Runways

✦ PLANS of United States air lines to use giant planes on inter-American commercial air routes have increased interest in the availability of airports capable of handling these transport planes. Few such airports now exist in the other Americas.

Already Pan American World Airways has disclosed plans at a hearing before the Civil Aeronautics Board to purchase for its services in the Americas nine Douglas DC-7 4-engined 108-passenger planes, eighteen Lockheed Constellation 4-engined 56-passenger planes, and twenty-three twin-engined Type 12 planes of 20,000 pounds gross weight by a maker not yet named. Similarly, Pan American-Grace Airways, PANAGRA, has announced that it has contracted to buy three Douglas DC-6 4-engined 56-passenger planes. PANAGRA's recent advertising has also mentioned contemplated use of Lockheed Constellation 300-mile-an-hour planes. and Douglas DC-4 4-engined 44-passenger planes on its routes.

Sizes of Airports

The Civil Aeronautics Administration has set up classifications for airports which divide them into five classes in regard to number and length and width of runways and landing strips, clearance, altitude, and facilities. Altitude is included because the higher the airport is above sea level, the more rarefied the atmosphere and the longer must be the landing strip to conform with safety requirements.

Under this classification system, planes having a gross take-off weight of 74,000 pounds and over require a Class 4 or Class 5 type of airport, with landing strips or runways equivalent in safety to strips 4,700 to 5,700 feet and over in length, respectively, at sea level, to comply with the safety requirements of the Civil Aeronautics Administration. In the case of smooth bituminous and concrete surfaces, a shorter ground run is required to attain take-off speed than if the surfaces are of loose gravel or of soft sod, and, therefore, a smaller landing area may be used.

For reasons of military security, the exact number of Class 4 and Class 5 airports in the twenty other American republics has not been made public, but their number is conceded to be smaller than post-war air transport will require for a high standard of service.

According to the Air Transport Information Division, Civil Aeronautics Board, at the close of 1944 there were in the other Americas between 300 and 400 Class 3 or better airports capable of handling the twin-engined 21-passenger planes currently in general use on the main air routes there. A Class 3 airport at sea level has landing strips 3,700 to 4,700 feet in length. Altogether, the other American republics had approximately 2,400 airports of all types by the close of 1944.

Plans for Future

Reports to Washington from Chile quote Senator Carlos A. Martinez as stating that at present Antofagasta has the only airport in Chile which could properly be used by aircraft larger than present transport planes. Senator Martinez is quoted as proposing that measures be taken to provide at least six airfields of a minimum length of 6,561 feet.

Besides the improvement of existing facilities, Senator Martinez suggested construction of new fields for all types of aircraft in Valdivia, Osorno, Temuco, and Puerto Montt as well as intermediate fields between Puerto Montt and Magallanes.

Venezuela's program for future development of international trade and travel includes the construction of six new modern airports by the end of 1945. In addition, two new modern airports were recently put in use at San Antonio Tachira, near the Colombian border, and at Barrancas, on the Orinoco River. Two other new airports will be completed within three or four months, according to the statement of the Director of Communications of the Venezuelan Ministry of Public Works, Dr. Francisco Sucre, in a recent interview at Miami, Fla.

Peru's Minister of Aeronautics is reported to have announced the planned construction at Limatambo Airport of two asphalt-paved runways 5,905 feet long x 131 feet wide and three taxiing lanes 8,202 feet long x 65.5 feet wide. The landing field will be completed with the addition of two lateral lanes each 98 feet wide.

BUSTING ROCKS ... *not the buster points!*

DRIVEN by a 14-ton shaft! Dropped 9 feet four times a minute! You couldn't think of more severe service than that to which these rock buster points are subjected! Yet they are standing the gaff. Because of their Coast Metals hard-facing, they possess exceptional resistance to impact, shock and wear. And give several times the life of ordinary points!

Coast Metals hard-facing is equally applicable to new parts or old ones, of any ferrous metal, including manganese steel, cast iron and chilled iron. Easy to apply—by the electric welding arc or oxy-acetylene torch.

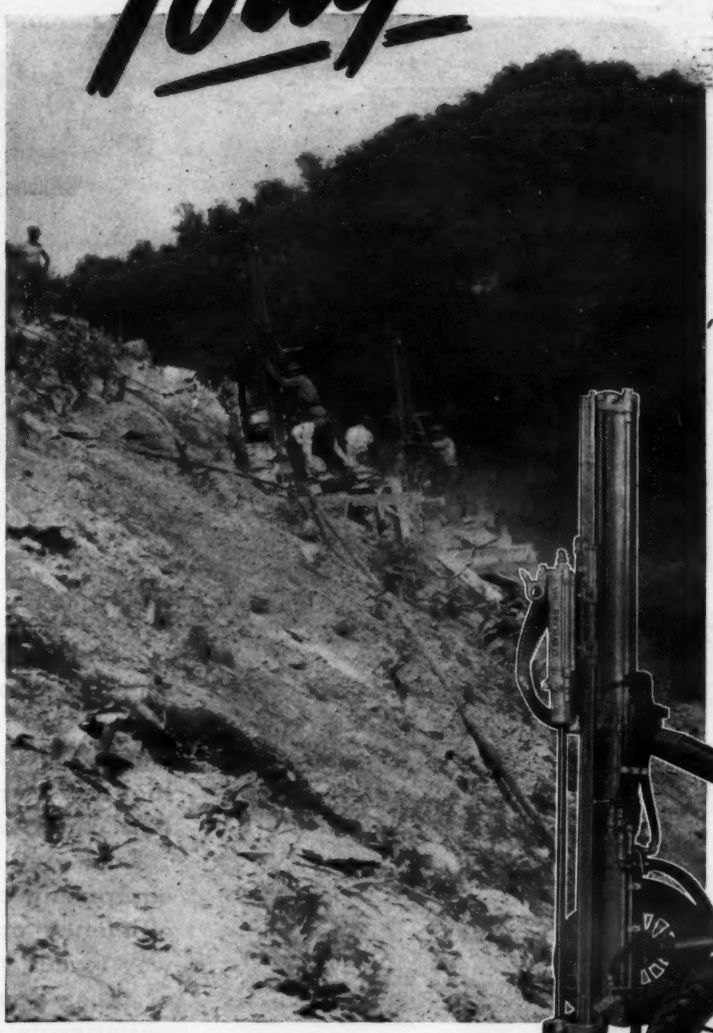
Let our engineers show how you can use Coast Metals hard-facing to keep your equipment on the job without frequent time out for repairs or replacements!

COAST METALS, INC. *Plant and General Offices:* Canton, Ohio *Executive Offices:* New York, N.Y.

COAST METALS *hard-facing weld rods*

MAKE YOUR EQUIPMENT LAST LONGER

Tough Terrain!

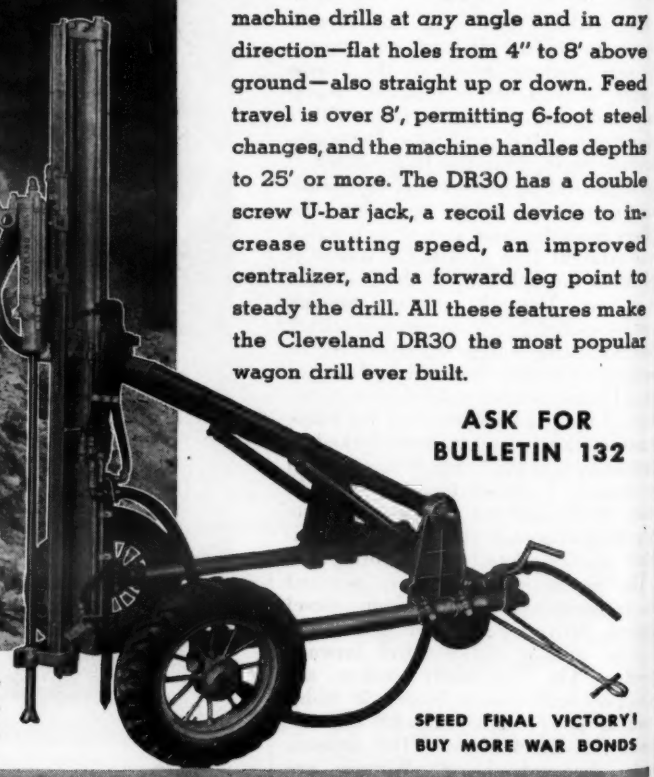


But NOT too tough for CLEVELAND Wagon Drills!

● The mountain side is so steep on this road-building job that the wagon drills must be held with ropes. Yet even under such difficult conditions the Cleveland DR30 proves its mettle.

As this picture indicates, the DR30 is unsurpassed in maneuverability. The machine drills at *any* angle and in *any* direction—flat holes from 4" to 8' above ground—also straight up or down. Feed travel is over 8', permitting 6-foot steel changes, and the machine handles depths to 25' or more. The DR30 has a double screw U-bar jack, a recoil device to increase cutting speed, an improved centralizer, and a forward leg point to steady the drill. All these features make the Cleveland DR30 the most popular wagon drill ever built.

ASK FOR BULLETIN 132



Pneumatic tires now obtainable if specified by purchaser in his application for priority to Construction Machinery Branch of War Production Board.

SPEED FINAL VICTORY! BUY MORE WAR BONDS

LEADERS IN DRILLING EQUIPMENT

BRANCH OFFICES

Birmingham, Ala. · Boston, Mass. · Buffalo, N. Y. · Butte, Mont. · Chicago, Ill. · Cincinnati, Ohio · Dallas, Texas · Denver, Colo. · Detroit, Mich. · El Paso, Texas · Ironwood, Mich. · Lexington, Ky. · Los Angeles, Calif. · Milwaukee, Wis. · New York, N. Y. · Philadelphia, Pa. · Pittsburgh, Pa. · Richmond, Va. · Salt Lake City, Utah · San Francisco, Calif. · St. Louis, Mo. · Wallace, Idaho · Washington, D. C.

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THE CLEVELAND ROCK DRILL CO.

DIVISION OF THE CLEVELAND PNEUMATIC TOOL COMPANY

CABLE ADDRESS: "ROCKDRILL" · CLEVELAND 5, OHIO

Sense and Science About Centrifugals

There are two types of centrifugal pumps: those which cannot prime themselves, and the newer, self-priming type. The first centrifugal was invented in 1732, but most of the improvements which have brought centrifugals to their present high stage of development have taken place during recent years. One of the most interesting and understandable publications on centrifugal pumps, how they operate, the self-priming principle, and when and where self-priming pumps are important is a new 20-page pamphlet "Self-Priming Centrifugal Pumps" by A. S. Marlow, Jr.

This handbook is replete with illustrations showing both the sense and science of these service pumps. Copies may be secured without cost direct from Marlow Pumps, Ridgewood, N. J., by mentioning this review.

Air-Entraining Cement

An 8-page booklet on Atlas Duraplastic air-entraining portland cement has just been issued by Universal Atlas Cement Co., 135 E. 42nd St., New York 17, N. Y. The booklet is devoted to the nature and characteristics of air-entraining cement as originated and developed by Universal Atlas, with illustrations giving examples of the variety of its uses. Originally developed as a cement that would make concrete highly resistant to the effects of freezing and thawing weather and to the scaling caused by repeated applications of salt used for de-icing of pavements, the booklet points out that the same characteristics have made this cement highly desirable in other fields of concrete work.

Copies of the booklet describing Atlas Duraplastic may be secured direct from Universal Atlas by mentioning this text.

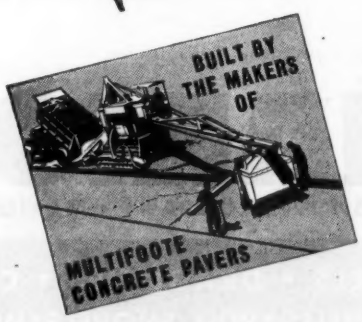
Avoid Tire Failure

Many tire failures can be prevented by sharp-eyed drivers. The B. F. Goodrich Co.'s *Rubber News Letter* urges that, when you see a tire that is starting to bulge dangerously or is "soft," you pull into a service station or report promptly to your garage and have the tire checked for excessive heat, cuts, bruises, or punctures. Or the tube may have a slow leak.

If small bruises or cuts are repaired immediately, a blow-out may be avoided and the tire will have a chance to live out its normal life.

Only an ADNUN can lay BOTH-

BASE
Any Material
up to 6" depth
and
BLACK TOP
Any Width . . . Any Thickness
Any Mix . . . Hot or Cold



LAYING crushed stone or slag in depths up to six inches, or sheet asphalt only a fraction of an inch thick are everyday jobs for an Adnun. The material can be hot or cold and the width and depth can be controlled to meet any specification.

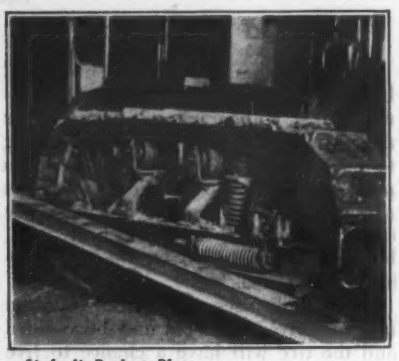
The combination of Adnun features—Power Cut-Off, Cutter Bar Strike-Off, and Continuous Course Correction produce a final surface smoothness unexcelled by any other method. The power cut-off provides positive control of the flow of materials. The cutter bar strikes off the material to the correct thickness and has an overlapping and crowding action that makes a tight, positive joint with parallel course or curb, greatly reducing hand labor back of the machine.

Continuous course correction automatically corrects hollows and bumps with each successive course. These features particularly fit the Adnun for highway or airport building with the minimum of subgrade preparation and insure a smoother surface even with perfectly finished subgrades. Write today for details or see your Foote distributor.

THE FOOTE CO., INC., 1916 State St., Nunda, N. Y.
THE WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF CONCRETE AND BLACK TOP PAVERS

ADNUN
TRADE MARK REGISTERED
BLACK TOP PAVER

WITH CONTINUOUS COURSE CORRECTION



Linde Air Products Photo

Hard-facing the fifty-eight cleats on the treads of this 10-ton tractor used in snow plowing saved a midwest highway commission over $650 in one winter. Besides the savings in dollars, the hard-faced treads save time and labor.

Stiff Concrete Mix Vibrated Internally

The vibration of stiff, harsh concrete mixes for highway and airport paving is a problem which will be met increasingly as the highway and airport extension programs get under way when war ceases. The advantages of complete internal vibration of the pavement slab have been discussed at technical meetings, and the necessity of freedom from voids, with maximum uniformity and high density, has resulted in an increased desire to use heavy-duty vibrators in thick pavement slabs.

The Jackson heavy-duty vibratory paving tube is mounted on any conventional concrete finisher ahead of the front screed. A hydraulic lifting ram either raises the continuous vibratory tube or presses it into the new concrete to the required depth. Electric Tamper & Equipment Co., Ludington, Mich., manufacturer of the Jackson vibratory paving tube, states that, in addition to the saving due to the usual reduction in cement content per yard, up to 10 per cent, which is permitted when approved vibratory equipment is used, contractors may reasonably expect further economy and advantages through faster finisher progress even when dry mixes are specified, absence of honeycomb at either forms or joints, and complete compaction with a good finishing surface without excessive mortar. There is also a reduction in the spreading cost when the powerful vibratory tubes enter unevenly spread batches, as the concrete quickly becomes plastic and tends to flow in a direction parallel to the tubes which iron out major humps and hollows, the manufacturer reports.

Complete information with specifications of this equipment may be secured direct from the manufacturer.

Dutch Collaborationist Contractors to Be Tried

Among the collaborationists who will soon appear before the special tribunals dealing with "economic offenses," established by the Netherlands government on December 16, are the contractors and builders who, during the years of German occupation, built airfields and concentration camps, barracks and defenses for the Nazis. Though their number is small, these contractors profited considerably from this work, and many are now trying desperately to convince the Netherlands Military Authority that they acted under duress. However, members of the resistance movement are seeing to it that these "turncoats" are unmasked.

The cities of Eindhoven and Tilburg, in liberated North-Brabant province, have gone a step further. They have organized a new Union of Building Contractors, from which will be excluded all those who have rendered aid of any kind to the enemy. The Union, made up of hundreds of contractors and builders who refused to work for the Nazis and who consequently suffered severe losses, began by compiling a list of collaborationist firms, which was sent to both the military and civil authorities.

This action was entirely in line with the intentions of the Netherlands Minister of Justice, Dr. Gerrit Jan van Heuven Goedhart, who has repeatedly promised that "all who amassed riches through collaborating with the enemy will be severely punished."

Rockford Drilling Machine Division Takes New Name

The name of the Rockford Drilling Machine Division of Borg-Warner Corp., at Rockford, Ill., has been changed to Rockford Clutch Division. At present, it supplies medium-tank clutches for the U. S. Army and also clutches for use by the Navy.

With three factories in war production, and a corresponding increase in its engineering activities, the Division recently acquired the Borg-Warner research laboratory at Rockford and will operate it as the Rockford Clutch Engineering Laboratory.

LOOKING AHEAD?
Include
TUTHILL GUARD RAILS
in Your Plans

HIGHWAY ENGINEERS are now making plans for their post-war safety program. Many of them, knowing by reputation and service the TUTHILL GUARD RAIL, are including it in their post-war specifications.

Convex design. Spring-like action for greater safety. Easy to install and maintain. *Available for complete installation, maintenance and repairs.*

Pacific Coast Manufacturers and Distributors
U. S. SPRING & BUMPER CO., LOS ANGELES, CAL.

Write for detailed specifications.

TUTHILL SPRING COMPANY
762 POLK ST., CHICAGO 7, ILL.

PROGRESS
THROUGHOUT THE YEARS!

1884 1906 1933 1945
MARION ACHIEVEMENTS THROUGH THE YEARS WILL BRING YOU THE SHOVEL OF TOMORROW

★ MARION'S contributions to power shovel design and performance have been outstanding for over 60 years.

MARION has anticipated industry's needs by building machines of ever greater speed — capacity — and range.

NOW — TODAY — there is a MARION of the correct size and type to master every material handling problem and digging condition.

What is your problem? Let's discuss it.

THE MARION
STEAM SHOVEL COMPANY • MARION, OHIO

SHOVELS • DRAGLINES • CRANES
CLAMSHELLS • PULL-SHOVELS • WALKERS
From 3/4 cu. yd. to 35 cu. yds.

Typical Garage-Shop In Erie County, N. Y.

(*Continued from page 2*)

to the repair and maintenance of equipment. Access to this part of the shop is provided by ten overhead doors, 18 feet wide x 12 feet high. Six of these doors, counting from the north end, are hand-operated, while the remaining four are operated by an electric motor.

The garage receives good natural illumination from large windows on the east side of the building, 6 feet long x 6 feet 6 inches high. This lighting is augmented by four overhead electric lights in each 20-foot bay. Ten coal stoves with a common draft pipe furnish heat.

A Peerless 2-ton overhead crane runs the length of the building on a monorail. An Ingersoll-Rand compressor furnishes air for the shop. Other equipment includes an Allen Unitron Rectifier for charging batteries; an Allen motor tester for checking coils, condensers, and cylinder compression; a 75-ton Atlas hydraulic press; an Atlas 6-foot x 40-inch lathe; a Sioux 5/8-inch heavy-duty drill; a Black & Decker electric grinder; a Champion spark-plug tester; a Sioux valve refacer; and a Rex Degreaser using Triad degreasing solvent.

This equipment is strung out along the west wall of the garage where there are also located the mechanics' benches equipped with bench vises and outlets for reel lights and compressed air. A portable Oxweld acetylene outfit is moved around wherever welding is to be done. Thirty-five trucks of varied sizes and types are serviced here. Rolling floor dollies are used in greasing.

Beneath the main floor is a basement of the same dimensions, with ten doors opening into a yard on the east side of the building. Six coal stoves heat this basement which is given over to the storage of trucks, parts, and oil barrels.

Other Buildings

Located in the yard to the rear of the main building is a blacksmith shop housed in an 18 x 25-foot tile and brick structure with an asbestos-shingle roof. The shop has an overhead light and is heated by a coal stove. Equipment includes a 3-foot-diameter circular forge with an electric blower; a 200-pound anvil; a 2-inch Buffalo Forge drill; a Black & Decker 10-inch bench grinder; and a power-driven hack saw mounted on a dolly.

South of the blacksmith shop is a 16 x 18-foot well house in which a Gould New Pyramid pump draws water from a 90-foot well. This house is equipped with a Duro water-softening unit, a pressure tank, and a coal stove. Near the well house are two 10,000-gallon tanks for water storage.

Also in the yard is a 20-year-old asphalt plant once used for building county roads but now used for mixing bituminous material for cold patching. Adjacent to the plant is a 2,000-gallon fuel-oil tank and two 15,000-gallon tanks for asphalt storage.

Personnel

Arthur J. Yaw is Superintendent of the Erie County Highway Department.

C. & E..M. Photo

The East Lancaster Maintenance Plant of the Erie County Highway Department houses offices and servicing facilities at ground level, while the storage garage is equally accessible at a lower level.

The main office is in Buffalo, and the engineering and administrative force consists of twenty-two engineers and sixteen clerks, of which five engineers and ten clerks are located in the five division offices. Earl P. North, Sr., is First Assistant and Bridge Engineer, Edgar W. Earle is Engineer in charge of surveys, plans and construction, and William Borrmann, Engineer in charge of maintenance and snow removal. Burton F. Gibby is Supervising Accountant in charge of accounts.

I-P Tool Official Retires

W. H. Brewer, General Manager of the Aurora, Ill., factory of the Independent Pneumatic Tool Co. of Chicago, has retired due to failing health. Mr. Brewer, who has been with the company for 36 years and who has directed the production of Thor tools to more than five times the volume of any previous period in the company's history, was made Works Manager of the main plant in December, 1940, and became General Manager last April.

New Heil District Office To Serve the Northwest

Announcement has been made by the Heil Co., Milwaukee, Wis., of the opening of a Northwest District Sales Office in the White-Henry-Stuart Building at 1338 Fourth Ave., Seattle 1, Wash., with John Barclay in charge. This new office will provide on-the-spot sales assistance for Heil dealers and distributors in Washington, Oregon, Montana, Idaho, and Wyoming. The Heil line of products includes truck bodies and hoists, road machinery, transportage tanks and storage tanks.

For 68 Years Builders of Fine WHEEL BARROWS:
AMERICAN
STEEL SCRAPER CO.
Sidney, Ohio
Watch for Post-War Models

WHEN WINTER CONSTRUCTION CALLS FOR ONE OR ALL THREE..

Cleaver-Brooks equipment provides steam, heat or hot water — fast, efficiently and at low cost — for a wide range of cold weather needs, such as —

— heating asphalt, road oils, bituminous materials in tank cars and storage tanks.

— heating water for central mixing plants.

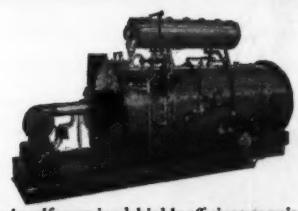
— thawing and heating aggregate in stock piles or bins — for winter concreting.

— steam for cleaning machinery, thawing frozen ground, operating steam hammers, heating buildings and offices, and other uses.

Write for bulletins and complete information on the entire line of Cleaver-Brooks equipment for cold weather construction and maintenance.

CLEAVER-BROOKS COMPANY
5110 North 33rd Street • Milwaukee 9, Wisconsin

AUTOMATIC STEAM PLANTS



Completely self contained; highly efficient; require only simple piping connections to place in operation. Fully automatic fuel-oil burner; condensate recovery and feed water pumping system; no stack needed, sizes ranging from 20 to 500 h. p.; pressures 15 to 200 lbs.

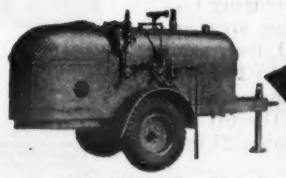
HOT WATER BOOSTERS

Oil-fired; fully automatic or manual operation; no licensed engineer needed to operate; two capacity sizes: 3000 gals. storage tank providing 1600 gals. of water heated 150° F. per hour; 1500 gals. storage tank providing 800 gals. of water heated 150° F. per hour.

PORTABLE PUMPING BOOSTERS

Heats bituminous material by direct firing in one operation, loading directly to distributor, relay truck or returning to tank car. Built in two sizes, truck mounting or 4-wheel trailer.

PORTABLE TANK-CAR HEATERS



Available in 2 and 3 tank-car sizes. Oil-fired with exclusive four-pass flue travel; dry-coil steam condensate return under pressure — no water or heat loss. An all-purpose unit — provides a portable source of steam wherever needed.

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PIONEERS AND ORIGINATORS OF
TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . . AUTOMATIC STEAM PLANTS

A Wide Fill Dredged For Galveston Ferry

Muck Stripped From Site, Then Sand Fill Placed; Piles of Landing Bridge Tested in Novel Manner

✦ THE construction of a new ferry slip for the Galveston Island-Bolivar Point, Texas, ferry, made necessary by the enlargement of a restricted military reservation, was done under four contracts awarded by the Houston District of the Texas Highway Department. The work of the four contractors, involving the placing of 237,000 cubic yards of dredged fill and the construction of a new ferry slip, parking area, approach road and necessary buildings, was preceded by the removal of 150,000 cubic yards of muck by state forces.

The new location was a tidal flat with an average elevation of 3 feet above sea level. The underlying material was sand capable of supporting a road bed. However, the area had been diked for use as a dumping ground for material cleaned out of Galveston Harbor. The depth of this dredged material along the highway location varied from 2 to 4 feet. The latest dredging operation had just been completed prior to this construction and the area was so soft that the surveying crews worked on skis. No contractor could be found who was willing to undertake the removal of this muck down to the sand so this work was performed by Texas Highway Department forces.

Removing Muck

Three draglines were used, a 1-cubic-yard P&H, a ¾-cubic-yard P&H, and a ⅜-cubic-yard Speeder, for the removal of the muck. Working on heavy timber mats from both ends of the 6,780-foot location, the three machines side-cast it to form dikes 100 feet apart, parallel to the center line of the proposed road, with their tops at an elevation of 10.5. The heavy infiltration of water was kept down sufficiently to permit operations to proceed by an 8-inch, a 4-inch, and three 2-inch centrifugal pumps operated continuously throughout the work. At the end where the ferry landing and buildings were to be constructed, an additional area of approximately 3 acres was mucked, prior to the construction of a stable foundation fill.

The beginning of the work was most difficult. Machines could travel only on the underlying sand and the overlying muck was so fluid that a large part of the excavated material ran back in the trench. Dewatering the trench finally stabilized the dikes so that the work could be completed.

Dredged Fill

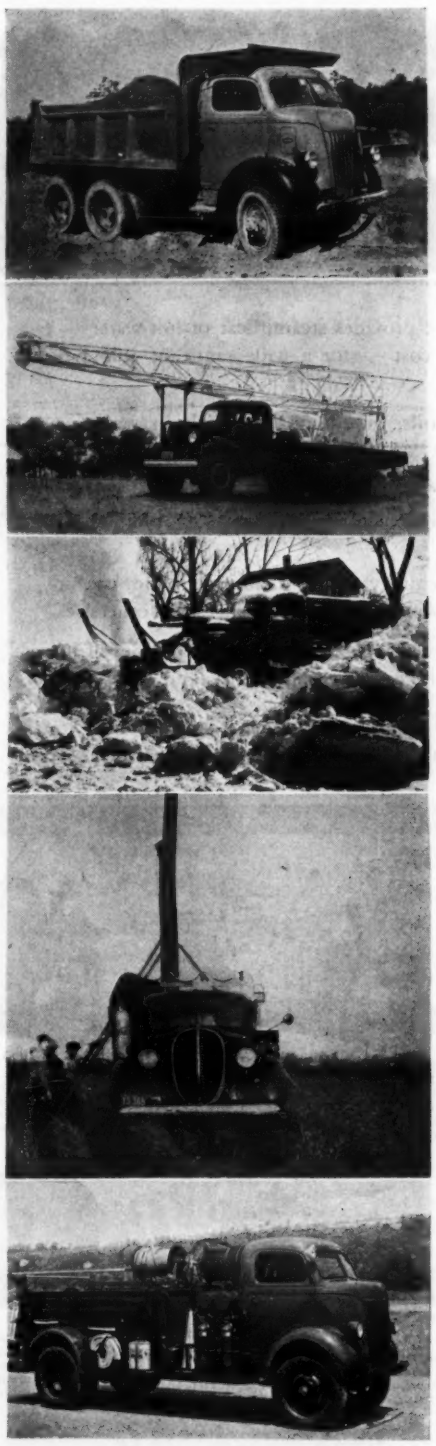
The contract to place dredged fill from 2.5 to 10 feet deep on 14.5 acres was awarded to the Standard Dredging Co., Galveston, Texas. From an area approximately 1,100 x 1,000 feet, sand from an average depth of 15 feet was pumped by the dredge Burlington which has a 30-inch suction line. The fill material was transported through a 24-inch discharge line which was extended in either direction from the approximate mid-point of the fill, the floating line being connected alternately to the two land lines and pumping through one while the other was being extended. By this manipulation the average length of pump line was kept at 3,400 feet, with a maximum movement of material of 6,800 feet. In 16 days of 24-hour operation, the dredging contractor moved 237,000 cubic yards of material, forming an embankment, retained by the muck dikes, to an elevation of 9.5.

To control the discharge of dredged water without damage to the dikes, a temporary spillway was constructed. A cut-off wall 35 feet long was built of 3 x 8-inch planks parallel to the dike, with a similar wall 4 feet farther out and its top elevation 8 inches lower. Between these walls and extended beyond them for an additional 26 feet in the direction of flow, 2 x 12-inch lumber was laid on the flattened muck banks, covered with 2 x 8's placed at right angles, and these were covered with asphalt-impregnated roofing. Originally constructed to an elevation of 7.0, this spillway was raised to an elevation of 10.0 before completion of the dredged fill.

A rather open derrick-stone jetty protected the shore line adjacent to the area chosen for the new ferry landing and,

(*Continued on next page*)

A wooden spillway was built in the retaining dike to provide an outlet for dredged water and was raised 3 feet during the placing of fill for the new ferry slip at Galveston, Texas.



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TRACTION
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MANEUVERABILITY

The outstanding popularity of Marmon-Herrington *All-Wheel-Drive* converted Fords is a natural result of correct engineering and dependable construction. Not "War Babies" in any sense of the word, these amazingly effective trucks combine all the speed, dependability, and economy of standard Fords with the added effectiveness of power and traction applied through all four, or all six wheels. Proved in world-wide service for many years before Pearl Harbor, they provided the "know how" which enabled America and her allies to have the most effective automotive equipment the world has ever seen, when war came.

These trucks were used extensively before the war in the oil industry, public utility, road building and road maintenance services, including snow removal, and for numerous other extra-difficult transportation jobs. Many are old enough to receive honorable discharge from service but they still "carry on," and *will* until the war is over.

Again, for Peace-time operation, where unfailing performance is required on and off the highway and across country, Marmon-Herrington vehicles will be even better, as a result of war-time experience.

Write *now* for literature, and plan to add some of these units to your fleet. The cost will be less than you expect.

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Chicago, Ill. San Francisco, Cal. Dallas, Tex.

New Fill for Ferry Built at Galveston

(*Continued from preceding page*)

in order to retain the dredged fill, it was necessary to construct a water-tight wall between the individual derrick stones and also to raise the elevation of the wall about 2.5 feet above the grade of the jetty. A concrete wall approximately along the center line of the jetty and extending from below sea level to the top of the jetty was constructed by state maintenance forces. The upper 2.5 feet of fill was retained by a wall of sand bags.

Pile Slip and Landing Bridge

The ferry slip, 271 feet long, consists of clusters of three creosoted piles 50 feet long driven at 3-foot centers, connected by thirteen 8 x 8-inch wales and faced with ⅜-inch steel plates. At the outer end of each slip wall a cluster of thirty-one piles bound with cables protects the two slip-wall entrances and halfway down each and at the shore end four 8½-foot-diameter dolphins of 50-foot steel sheet piling, sand filled, provide additional strength.

A 30-foot span of 18-inch I-beams with Irving open steel-mesh flooring constitutes the end member or movable apron of the landing structure, with its shore end on a horizontal pivot to allow for vertical movement of the other end, and the pivot bearings sliding against coil springs to absorb shocks from the incoming ferry. The outer end of this movable span is supported by two steel pontoons 4 feet in diameter and 4 feet high which are attached to the ends of a 6-inch double-strength pipe placed horizontally against the floor beams at right angles to their long axis. The pontoons, partly filled with oil to provide greater stability, operate in a box of 3 x 8-inch boards built around four piles, and support the weight of the free end of the movable span, assisted by two 7½-ton concrete-block counterweights suspended by pulleys and cables from a gallows frame built of four 70-foot piles driven to extend 14 feet above the roadway, with their protruding ends collared and cross-braced with 3 x 8-inch lumber.

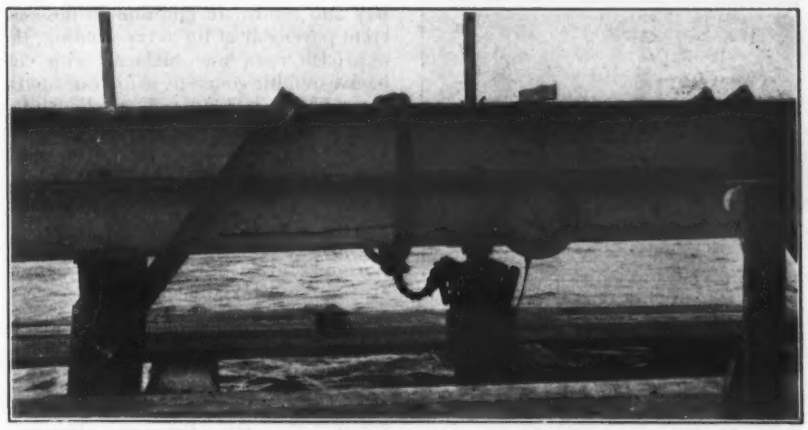
The fixed portion of the landing bridge is a 65-foot-long continuous span of I-beams supporting a concrete deck with a 22-foot 6-inch roadway and a 3-foot sidewalk, and a 25-foot span at the shore end. The substructure at each bent consists of a concrete cap supported on five steel piles of 10-inch 74-pound wide-flange beams averaging 75 feet in length. The steel piles are protected by concrete collars 24 inches in diameter and 16 feet in length. These collars extend from the top of the pile and have an average penetration of 10 feet in the ground below the bottom of the bay.

Load Test Results

Marine driving was done from a floating pile driver, 30 x 80 feet in size, with 65-foot leads in which was operated a No. 1 Vulcan steam hammer, while the driving of the steel piles for the bridge piers was done by a steam-powered skid rig operating a similar hammer in 65-foot leads.

When the 10-inch wide-flange beams had been driven 60 feet into the sand bottom, bearing formulae indicated a supporting value of only 3.7 tons per pile, insufficient to carry the structure. Doubting the accuracy of this information, the engineers decided to apply load tests to several piles and the results were most satisfactory.

A 70-ton hydraulic jack, borrowed from the Missouri-Pacific Railroad, was placed on the head of the pile undergoing the test, and gaged to read directly in tons of applied load. Two 10-inch I-beams, one on top of the other, were placed on the jack and their ends tied down to previously driven piles on each side. At least three days were permitted to elapse between the last driving and the application of the test load which was increased in increments of 5 tons to a maximum of 40 tons and kept at that amount for 48 hours. A small movement of the jack handle every 30 minutes compensated for leakage within the jack and resulted in the application of a constant load. This severe test on piles which had showed a bearing capacity of 3.7 tons by formula produced a permanent settlement of only ⅛ inch and was accepted as conclusive proof of the adequacy of the piling in place.



A close-up of the hydraulic jack and gage used in testing the bearing capacity of wood piles driven for the new ferry slip at Galveston Island, Texas.

Buildings

A separate contract for buildings included the construction of a 36 x 43-foot one-story office building of hollow-face tile construction set on 20-foot

(*Concluded on next page*)

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A complete line for every type of Rock Drill, Pavement Breaker and Clay Digger.

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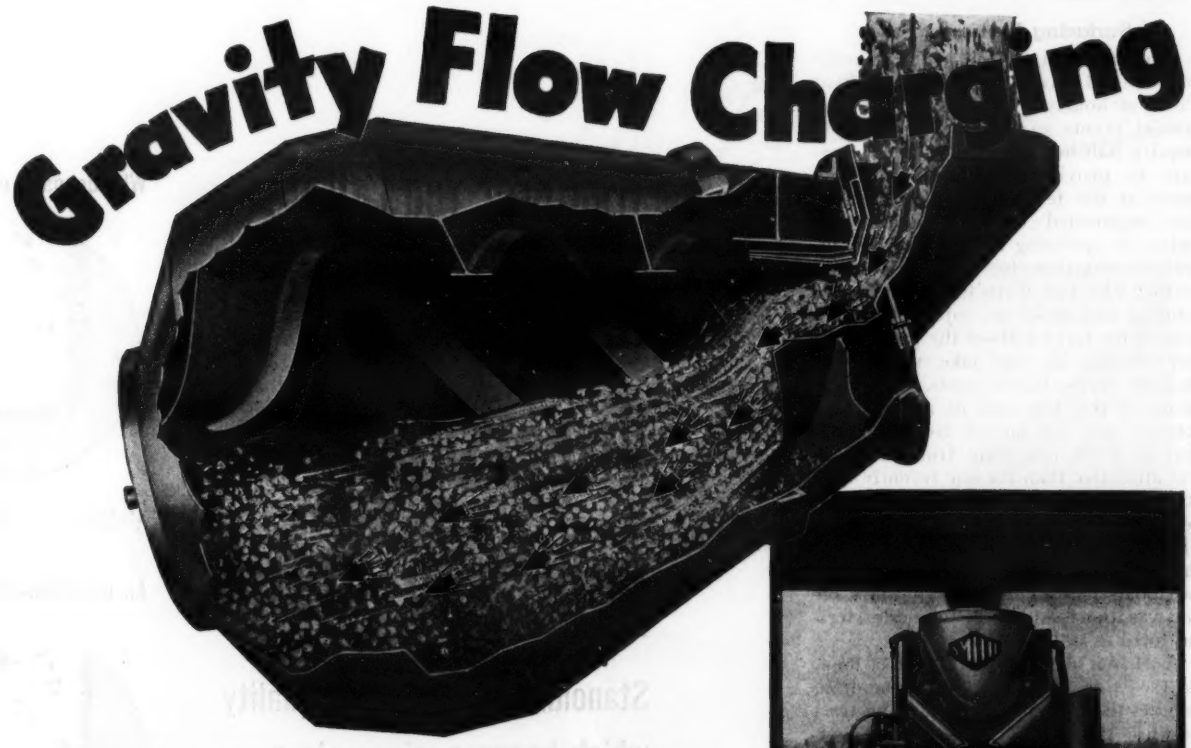

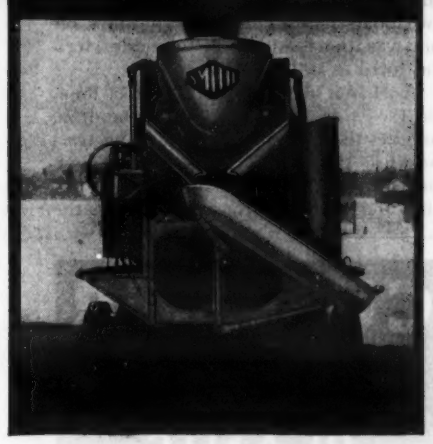

No Drum Obstructions! No Bottleneck! Materials Speed to Opposite End of Drum

Smith-Mobile's big, roomy feed chute and patented drum construction speeds up truck-mixer charging. The aggregates drop vertically into the chute and continue at high velocity through the charging cone (an exclusive and patented Smith feature) toward the opposite end of the drum. *Gravity does the job!* The action of the mixing blades merely accelerates the flow of the materials. There are no shafts or rods to clog up the feed chute. Smith-Mobile is by far the fastest charging truck mixer on the market.

Merely drive your Smith-Mobile into the batching plant with drum rotating in mixing position . . . receive the materials . . . and drive right out again. There's no charging "bottleneck", and mixing starts the instant the materials enter the drum. You'll find Smith-Mobile faster all the way . . . in charging, mixing, discharging. Get the complete Smith-Mobile story. Ask for Cat. 198-C.

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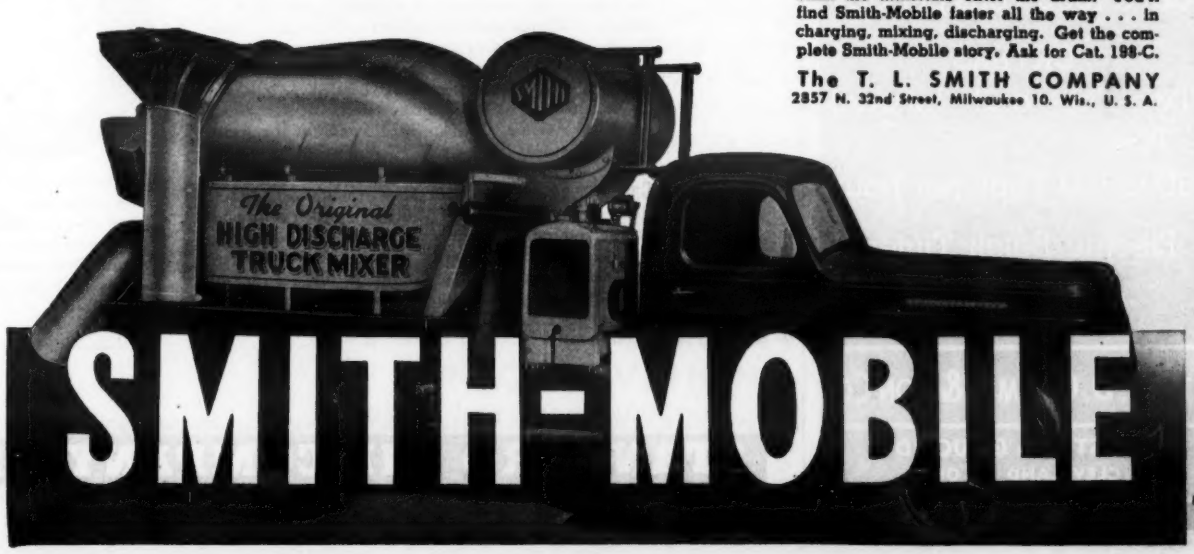

SMITH-MOBILE

A 4580-1P

Load-testing piles for the new Galveston ferry slip.

New Ferry Slip

(Continued from preceding page)

treated piles, placed not so much to support the structure as to tie it down as protection from the high winds which occur at the location. A 35 x 70 carpenter shop for maintenance work on the ferries and landing structures and a public toilet were also included in the building contract.

Surfacing Parking Area

Since the ferries start their 2¾-mile trip from Galveston Island to Bolivar Point at hourly intervals, except when special events so increase traffic as to require half-hourly trips, it was necessary to provide considerable parking space at the ferry landing. This need was augmented by the Department's policy of operating the ferry as a sightseeing attraction for visitors to Galveston, who can leave their cars at the landing and make an enjoyable round trip on the ferry without the payment of any charge, or can take their automobiles across for 25 cents. The popularity of this trip and its attraction to tourists may be judged from the fact that in 1939, operating from landings less attractive than the one recently constructed, the ferries carried 200,000 vehicles and 725,000 foot passengers. This large volume of business requires the use of five full crews to operate the two boats in use, allowing for days off and vacations, and a considerable clerical force as well.

A 24-foot concrete road 800 feet long, in the area adjacent to the landing, handles the incoming and outgoing traffic while two 22-foot lanes 400 feet long provide parking space for vehicles left standing while their passengers cross the bay and return. In addition to the concrete pavement at the ferry landing, the approach road was surfaced with cutback asphaltic concrete, using fine aggregate of ⅝-inch to 80-mesh, applied at the rate of 75 pounds per square yard on a 10-inch stabilized shell base. The muck dikes roughly placed to retain the dredged fill were dressed down to a uniform slope, sprig-sodded with St. Augustine grass and seeded with Bermuda grass for protection against erosion, and for appearance.

Contract Data and Personnel

The contract for the dredged fill was awarded to the Standard Dredging Co., Galveston, Texas, on its low bid of $38,272.27; Ole Peterson, Houston, Texas, constructed the ferry slip and landing bridge for $65,839.00; Eslinger-Misch, Texas City, Texas, erected the buildings for $35,570.00; and the Consolidated Construction Co., Edna, Texas, performed the surfacing, slope dressing, and sodding for $71,170.00. For the Texas Highway Department, of which D. C. Greer is State Highway Engineer, the project was supervised by W. J. Van London, District Engineer of District 12, with headquarters at Houston. Detail supervision at the site of the work, which was carried on in 1943 and 1944, was exercised by George E. McDaniel, Jr., Resident Engineer.

Safety Goggle Has New Eyecup Design

Shaped separately to fit the contour of the right and left eye, the eyecups of the new Duralite safety goggle fit snugly against the face and protect the eyes from objects striking from the sides, top or bottom. Air channels and extra side perforations reduce the possibility of fogging, resulting in more accurate work and less tendency to eye fatigue.

The new 301A Duralite goggle is supplied with either 50-mm Super Armorplate lenses in white glass or Calobar medium, dark, or extra dark shades. Six-curve Super Armorplate lenses can be furnished if desired.

More complete information may be secured from the American Optical Co., Southbridge, Mass., upon request and mention of this publication.

Materials Are Released For Use in Traffic Signs

Brass and steel have now been released for the manufacture of reflecto buttons and steel traffic signs and signals according to information received from the Cataphote Corp., Wall St., Toledo, Ohio, maker of reflectorized and other traffic signs. Since it is reported that 60 per cent of all highway accidents occur after dark and that the use of reflector buttons in traffic signs and roadside delineators has reduced night accidents, this increased production should mean added protection to motorists.

Complete information on Cataphote reflector buttons and signs, both plain metal and reflectorized, is contained in a 24-page catalog which may be secured upon application to the manufacturer.

CUMMER
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EIGHT SIZES
Up to 1000 Tons per day
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30 to 100 Tons per hour
Electric Batch Timers
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Whatever you call it...
detergency
dispersancy or
peptizing action

Stanolube HD has that quality which keeps engines clean

THE QUALITY in a truly HD (heavy-duty) motor oil that keeps engines clean has been given many names—detergency, dispersancy, or peptizing action are some. Regardless of the name you give it, *what* that quality is, and *why* it keeps engines clean, are of utmost importance to you.

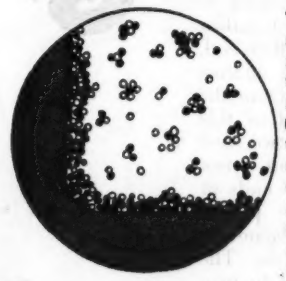
A simplified description at the right explains the difference between conventional, oxidation-inhibited motor oil, and those that have *both* added oxidation inhibiting and detergency or dispersancy properties—such as Stanolube HD. It explains why Stanolube HD keeps engines free from varnish and other engine deposits even under severe service demands.

You can get much more positive and convincing proof of the advantages of Stanolube HD by testing it on some of the hard-worked engines in your fleet. A Standard Oil Automotive Engineer will be glad to help you make such a test or show you actual fleets—perhaps near you—where Stanolube HD has provided clean engine operation when other oils have failed.

Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for the Automotive Engineer nearest you.

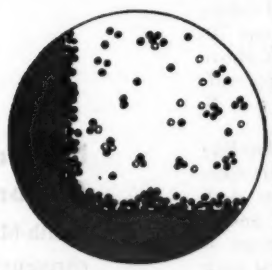
Cause of Engine Deposits Most troublesome engine deposits are caused by: (1) Fuel soot which originates in the combustion chamber and dust that enters the engine. (2) Oil deterioration products caused by excessive heat and agitation of the oil in the presence of oxygen. Both types of contaminants tend to accumulate more rapidly under heavy-duty service than in normal operation.

Why deposits occur in conventional oil



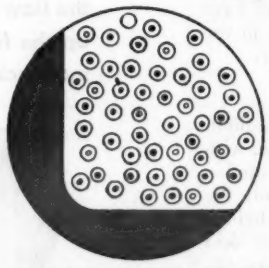
The first diagram shows how these typical contaminants are theoretically present in a used conventional oil. They have a tendency to adhere to each other and settle out of the oil, depositing on engine surfaces such as crankcases, pistons, oil screens, oil lines, and bearings.

An oxidation-inhibited oil gives only partial protection



The second diagram shows how oils appear with improved oxidation stability *only*. Oxidized oil particles are materially reduced. As a result, deposits are less heavy on engine surfaces. However, this does not prevent dust, fuel soot, and the remaining oxidation products from depositing in the engine.

Effect of an oxidation inhibitor plus a detergent in Stanolube HD



In order to render harmless *all* potential deposit-forming contaminants, Stanolube HD contains a combination oxidation inhibitor and detergent additive. The third diagram illustrates how the detergent theoretically surrounds all of the contaminants in the oil, including the small amount of oxidized oil present, with a film which prevents them from adhering to each other or to interior engine surface. It holds them in suspension in the oil until they are removed by filtering or draining, thereby eliminating troublesome deposits. A true heavy-duty oil has both detergency and oxidation stability.

Gasoline Powers the Attack . . . Don't Waste a Drop!

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

★ FLEET CONSERVATION SERVICE

A new chromate gasket which may be used to replace the usual rubber type for many applications.

New Chromate Gasket In Place of Rubber

A new type of gasket, consisting of a felt base impregnated with a chromate-pigmented compound which renders the material flame and fire-resistant as well as corrosion-resistant, has been announced by The Sherwin-Williams Co., 101 Prospect Ave., Cleveland, Ohio. Originally intended as a substitute for low-pressure rubber gaskets required in marine ventilating systems, chromate gasketing has since demonstrated its usefulness in many other applications, including joint seals in water, fuel-oil and diesel-oil systems, as well as gasketing for air-lock doors.

Formerly, where resistance to air pressures up to about 10 pounds per square inch was required, sponge rubber was usually employed. While generally satisfactory, particularly if the rubber was compounded with a suitable antioxidant, rubber gaskets lacked adequate heat and flame resistance. Chromate gasketing is flame and fire-resistant to a high degree and can withstand relatively prolonged exposure to salt water without decomposition. It may be either factory pre-cut or cut from sheets at the point of use without special tools.

Chromate gasketing employs, as a base sheet material, a good grade of thoroughly felted low-shoddy-content wool felt. The felt base is impregnated with a specially prepared compound which is non-drying, tack and water insoluble, and renders the felt flexible. Because the compressibility of a chromate gasket depends considerably on the method of treatment, great care is taken with the impregnating operation.

The manufacturer reports that a chromate gasket will maintain air pressures up to 25 pounds per square inch at normal temperatures. It is not affected by fuels and has definite rust-inhibiting properties. Chromate gasketing is dark green in color and is available 1/8 and 1/16 inch thick. In addition to its original application for sealing joints in air ventilator lines, forced-draft blowers and similar equipment, chromate gasketing may be used in flange-to-flange joints in drainage, fire-main, freshwater, flushing, sprinkling, fuel-oil and diesel-oil systems. It may be employed for watertight or oiltight connections to structures and as gasketing for air-lock doors and air-lock relief valves.

Complete information on chromate gasketing may be secured direct from the manufacturer by mentioning this item when writing.

Diesel Service Men

Before the war there was a lack of diesel-engine service men in civilian life. This condition will change rapidly as men are released from our armed forces, because of the great number who have been trained in servicing diesel engines used in tanks and landing boats on land and sea.

The Detroit Diesel Engine Division, General Motors Corp., 13400 W. Outer Drive, Detroit 23, Mich., has published a remarkably well illustrated book "The Power to Win" which describes the training of diesel mechanics who, because of this training in the servicing of Detroit Series 71 diesel engines, will be available for servicing the vast diesel-engine production of the post-war years.

Copies of this booklet may be secured direct from the manufacturer by those interested in this vast training program which is depicted in detail in this book.

Hose Service Manual

Correct procedure for attaching hose and couplings and useful data in selecting the proper couplings for your equipment are covered in a 12-page pocket-size service manual available from Hose Accessories Co., Lehigh Ave. at 17th St., Philadelphia 32, Pa., maker of the Le-Hi line of hose couplings and accessories. The section devoted to attaching methods is well illustrated, and the last page depicts various types of Le-Hi couplings and other hose accessories. Another feature of the booklet is an interchangeability chart, showing how Le-Hi products can be used with other similar types.

Copies of this service manual, and Catalog 644 containing more complete information on these products, will be sent upon application to the company and mention of this item.

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. . . eliminating the necessity of squirming out of "Close Quarters" . . . returning to the machine to make proper adjustments of welding current and then squirming back to resume welding. Remote Control allows the operator to make adjustments quickly and easily right at the job . . . thus saving considerable time and money. It will pay you to investigate "Simplified" Arc Welding and its time saving advantages! Hobart Bros. Co., Box CE-25, Troy, O.

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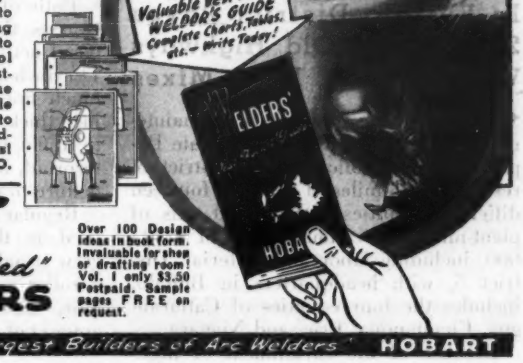

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Over 100 Design Ideas in book form. Invaluable for shop or drafting room! Vol. I only $3.50 Postpaid. Sample pages FREE on request.

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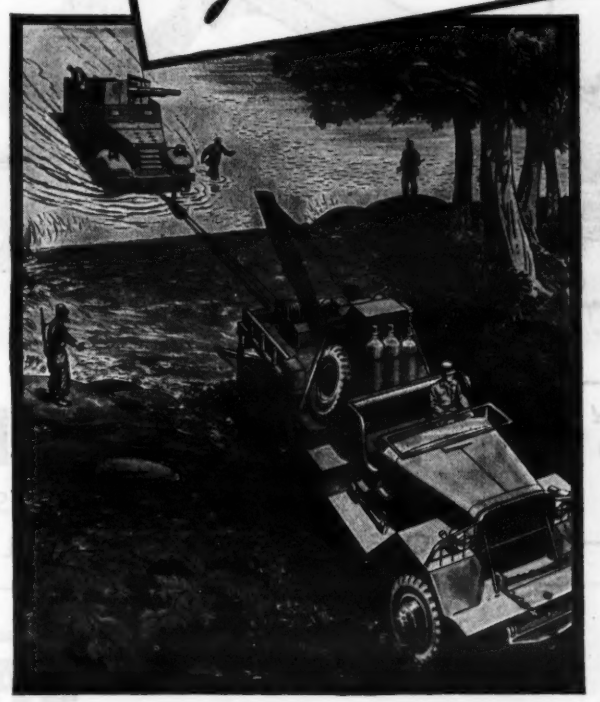
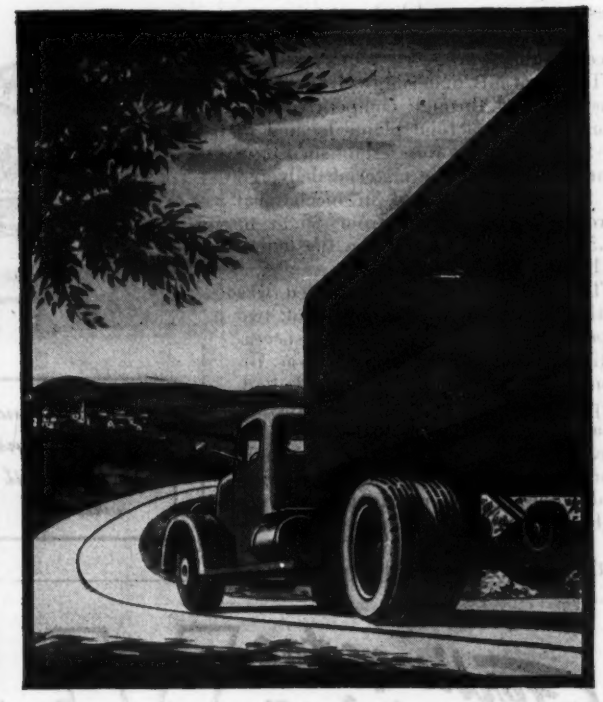
For a Quick Recovery





"Quick Recovery" is the job of the Heavy Wreckers built by Ward LaFrance for the armed forces. When a tank, truck, or half-track is put out of action, these rugged trucks go out and get them. They bring 'em back through sand, muck and rocky terrain, over nearly impossible trails or, often enough, cross country.

Using this equipment, a Rigger-Wrecker graduating class at the O.R.T.C., Aberdeen Proving Ground, hung up an unchallenged speed record by recovering an overturned five-ton truck from a deep ditch in three minutes and 28 seconds, under simulated battle conditions.

If your fleet has suffered from lost tonnage due to wartime lack of trucks, Ward LaFrance trucks are the best prescription for quick postwar recovery. Whether your needs call for dump trucks, over-the-road tractors (gasoline or Diesel), or vehicles engineered to your individual needs, Ward LaFrance offers your best profit opportunity: . . . A plan developed particularly for fleet owners makes it possible for you to take full advantage of the rugged power and dependability of Ward LaFrance trucks on a basis which will cut the cost of transportation to the bone.

WARD LaFRANCE

TRUCK DIVISION

GREAT AMERICAN INDUSTRIES, INC.

ELMIRA, NEW YORK

Reconstruction Impossible, So New York Lays New Tops

State Maintenance Crew In Buffalo District Paves 25 Miles of Old Highways With Asphalt Plant-Mixes

✦ DURING the 1944 season, maintenance crews of the New York State Department of Public Works, District 5, resurfaced 25 miles of roads in fourteen different localities with 34,000 tons of plant-mix at an estimated cost of $230,000, including labor and material. District 5, with headquarters in Buffalo, includes the four counties of Cattaraugua, Chautauqua, Erie, and Niagara.

Because of the curtailment of highway reconstruction of the past few years, it has been necessary, according to District Engineer Charles R. Waters, to increase the maintenance of pavement surfaces by state forces. Older roads require more than the usual oiling and patching so a program of bituminous resurfacing was instituted which would provide a smooth surface for traffic and increase the life of the supporting pavement by spreading the load. When resurfaced, these pavements need little attention, so the depleted maintenance forces can be used in other work.

The plant-mix material for resurfacing was obtained through competitive bids from five commercial plants located in the district. Prices were established on a tonnage basis for the material delivered to the job and placed in mechanical spreaders, and varied from $5.35 to $7.58 per ton, depending on the length of haul.

The type of material furnished was optional with the contracting plant, two types being permitted under the specifications. One of these is known as Bituminous Macadam Mixing Method, Type 3, using a liquefier with the asphalt. The other, a patented mix, the Steam-Dispersion Process of Asphaltic Concrete, is a combination of asphalt and stone of prescribed sizes, with a light grade of asphaltic material known as a workability compound pre-mixed with the paving asphalt under steam pressure.

Both of these types are laid in two courses, the bottom layer of coarser material acting as a leveling course about 1¼ inches thick. The top course of a much finer gradation is laid about ¾ inch thick. After being rolled and opened to traffic, both types of pavement are waterproof, but of sufficiently open surface texture to make them non-skid.

Regular maintenance employees were used in this resurfacing program. A crew usually consisted of five laborers, a roller man, a spreader-machine operator, and a foreman. The average amount of material laid in a day was 200 tons and was limited by the amount received from the commercial plants. With the equipment and personnel employed, it was possible to take care of 300 tons or more per day.

Steam-Dispersion Mix Used

Military Road, State Route 265, just north of the city of Buffalo in Erie County, was recently resurfaced for a length of one mile with Steamix, the steam-dispersion-processed asphaltic concrete. This 40-foot concrete pavement adjacent to Buffalo is a main artery for commercial traffic and over a period of years the pavement had become uneven. Already about 20 years old, it was surface-treated three years ago with 0.33 gallon of T-5 tar per square yard, and covered with 30 pounds of ½-inch slag per square yard, laid by a mechanical spreader and rolled by two 10-ton 3-wheel rollers.

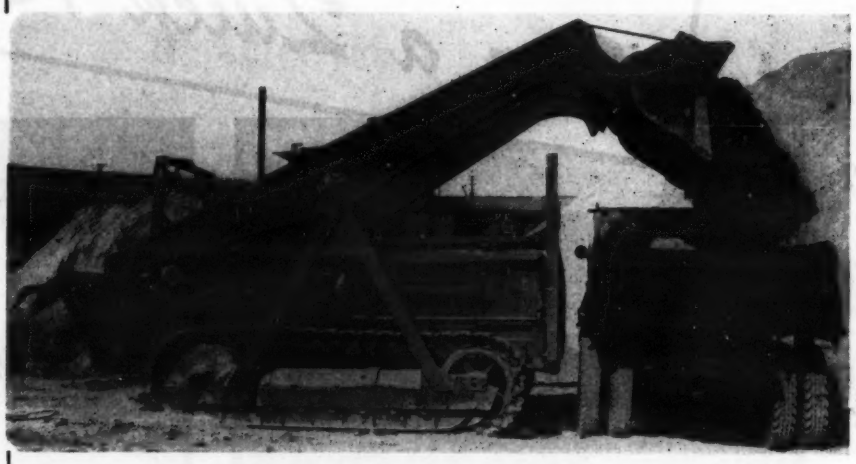
The resurfacing in 1944 was laid by an Adnun Black Top Paver in two 10-foot strips so that traffic could be maintained during the construction period. Eight trucks with a capacity of from 6½ to 8½ tons were used to transport the Steamix from the Buffalo Crushed Stone Co. asphalt plant at Bowmansville, N. Y., 12 miles from the job. The material was covered with tarpaulins to retain the heat. A single batch weighed 2 tons.

The base course was put down 2 inches thick and compacted by a 10-ton 3-wheel Huber roller to 1¼ inches. A 2½-ton Brockway truck carried a 300-gallon tank to supply the paver and roller with water, which was pumped out by a 1-inch Meyers tank pump. The roller wheels were kept well saturated with water. A pail of kerosene and old motor oil was used to swab off the rakes and shovels of the road crew to keep the mix from sticking to them. The top course was laid 24 hours later in a 1-inch loose layer which compacted to ¾ inch, making a total paving depth of 2 inches. Traffic was admitted immediately after rolling.

The seven-man paving crew, exclusive of truck drivers who were supplied by the asphalt plant, was directed by Gen-

(*Concluded on page 86*)

McCAFFREY TRACTOR SHOVEL



- 1½-yard capacity bucket.
- 100% cable control of bucket.
- Weight centered on truck frame.
- Design permits bucket to reach over center of the truck.

For sizes and specifications of this unit write to:

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Sterlings too, are helping to win **Victory**

Regiments of sturdy pre-war Sterlings are helping Uncle Sam on the home front, and the entire Sterling factory is being utilized for essential war production...two good reasons why Sterling Wheelbarrows are practically unobtainable today.

After peace has been restored, Sterlings will again be available, in all styles and capacities, to help in the reconstruction work.

STERLING WHEELBARROW CO., MILWAUKEE, WIS.

Look for this Mark of STERLING Quality

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TESTED and APPROVED for use on high tensile strength wire rope, by Underwriters' Laboratories—official testing laboratories for insurance companies.
ONE SAFE-LINE CLAMP is designed to hold any wire rope without slipping.
WIRE ENDS ENCLOSED. No needle-sharp wire ends, nuts and bolts exposed to injure workman's hands.
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HOLDS A TIGHT THIMBLE. When thimbles are used they will not loosen and fall out.

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Write for details of this—the only PERFECTED wire rope clamp on the market. Millions used by manufacturers, the Armed Forces and industries.

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Cartoon from ETO by Cpl. Gluck

"No one is getting by road blocks on our jobs."

Materials Testing For Illinois Roads

To the Bureau of Materials of the Illinois Division of Highways is given the responsibility for checking all materials which go into Illinois highways in order that there may be no doubt as to the quality of these materials. This Bureau, like all highway department subdivisions, has been operated with only from one-half to two-thirds of its technical employees since the war began. However, with efficient placement of men at plants and in the field, the quality of inspection has not been sacrificed.

The inspection situation was prevented from becoming critical by a series of circumstances produced by the war itself. The period of change from a peacetime to a wartime program passed in 1942 and conditions within the industry became more stable in 1943. Also, certain materials needed for the production of armaments and other war equipment were almost completely withdrawn from highway work. This was particularly true of steel products. Research and investigational work, although highly desirable during this period because of its probable value to the anticipated large post-war construction program, had to be restricted to that which the limited laboratory personnel could carry on in conjunction with the more immediate duties of inspection and testing.

It is felt in Illinois that in general the inspection of materials for highway construction at the source of supply is the most satisfactory procedure when the volume of work warrants. Many of the materials are low-cost commodities on which the cost of transportation exceeds the actual cost of the materials. Rejections on the job result in serious losses to the contractors and delay the work. For this reason, plant inspection has been maintained wherever possible, although a shortage of engineers and inspectors has made it difficult to carry out this policy at all times.

Field inspection of aggregates has been made at approximately 100 sand, gravel, and crushed-stone plants and at a smaller number of local plants. This work has been handled by engineers assigned to plants and the district engineers of materials and their assistants. Plant inspection of bituminous materials has been limited to four plants in Illinois. This work was undertaken only when the shipments were large enough to justify a full-time inspector.

In 1942, the Bureau of Materials adopted a policy of testing all cement at the Springfield laboratory instead of at the mill, as had been done in the past, partly to meet conditions such as reduced personnel and scarcity of laboratory equipment, and partly because more complicated testing technique required closer supervision. This policy proved successful and has been continued.

A new material which had not been included in the tests of the Bureau prior to 1943 is membrane curing compound. The Division of Highways was faced with the problem of adopting some method of curing concrete which did not require the use of burlap or impermeable paper, these materials having become difficult to obtain by reason of the war emergency. Since the so-called membrane curing compounds had been used with apparent success by several of the states and by the Federal government, it was decided to permit their use in a limited amount of work to alleviate the demands for other material and to obtain experience in the use of these compounds. The use of these compounds was permitted as an alternate method of curing in all concrete patching contracts let during 1943 and, at the request of the contractor, in the completion of pavement patching contracts let during 1942. In connection with this work, 153 samples of curing compounds were tested for compliance with the specification requirements, and 27,518 gallons of the material were accepted for use.

For many years, a cooperative agreement has existed between the highway departments of the states in the Mississippi Valley whereby they inspect materials for each other at cost. This cooperative work has many advantages; it not only means a saving of time and expense, but also assures inspection by a responsible agency. These highway departments have the same problems and use the same standard methods, largely those of the American Society for Testing Materials and the American Association of State Highway Officials. Each, therefore, is thoroughly conversant with the manner in which the work is done, and all are assured of uniformity in inspection methods.

WIN POWER ELECTRIC PLANTS

DIESEL ELECTRIC PLANT
4500 Watts, 115 Volts, AC
Model D1-5A

An extremely compact, durably built diesel plant, combining the economy of a diesel engine with a low purchase price. Enables the small power user to share in the sensational savings possible with safe, economical Diesel power.

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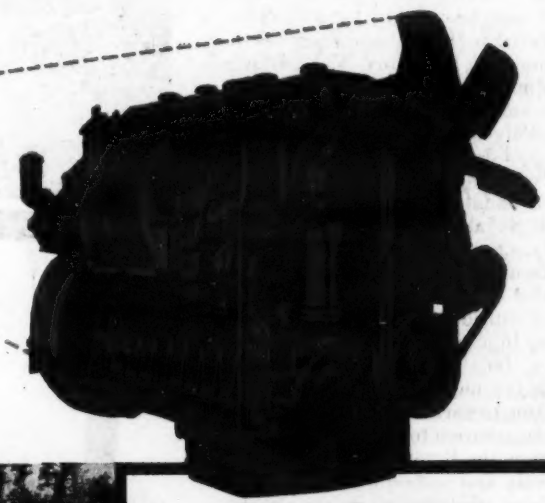
WIND POWER MFG. CO., NEWTON, IOWA

WATCH 2-CYCLE!
The Modern Diesel for Modern Road Builders

Keep your eyes on 2-cycle Diesel tractors and motor graders! Out to smash all earth-moving records . . . these units will play an important part in pushing through the big construction jobs ahead. When they are working in your territory . . . check their performance . . . satisfy yourself that 2-CYCLE is the kind of power you want.



WHAT 2-CYCLE DIESEL POWER MEANS:

TO A TRACTOR

It means *plenty of drive!* Every down stroke of the piston is a power stroke. It means *smooth power* — maintains high torque over a wide speed range. It means *faster power*—there is quick pick-up . . . less gear-shifting . . . high-speed hauling. It means *thrifty power*. Unit injectors simplify fuel system, reduce maintenance cost—fuel is thoroughly atomized, burns completely and develops maximum power.

TO A MOTOR GRADER

It means power to move *more material*. Extra dirt-moving capacity is built into the A-D Motor Grader. You can handle the heaviest kind of work —from deep, tough scarifying to high, heavy bank cuts. You get *a smoother job*, too — has the reserve power to carry you through tough cuts with fewer blade adjustments. Gets the job done *faster*—works in a higher gear!

KEEP AN EYE ON THE FUTURE
BUY AND KEEP WAR BONDS

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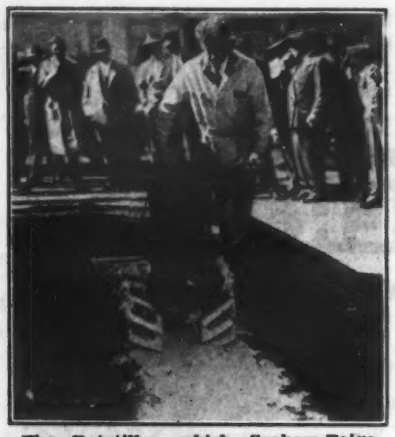

The Rototiller, which Graham-Paige Motors has announced it will produce in volume as soon as materials are available, demonstrating its serviceability on soil-cement jobs.

Rototiller Taken Over By Graham-Paige Corp.

Announcement has been made by the Graham-Paige Motors Corp., Detroit, Mich., of the acquisition of the manufacturing rights for the Rototiller, a versatile farm machine which has been adapted to road-mix and soil-cement operations in the highway and airport construction field. Exclusive North and South American license rights to manufacture and sell Rototiller machines, including walking and riding, road-building and heavy-duty farm models, were secured by the automotive concern from Rototiller, Inc., Troy, N. Y., which will continue to build a small wheelbarrow-type model and various attachments. Graham-Paige plans to utilize the distributor and dealer organization built up by the Troy concern and to expand these outlets to handle the new line of Rototillers. It is also stated that Graham-Paige plans to manufacture a wheel tractor for farm and similar uses.

Invented in Switzerland, the Rototiller was introduced to America fifteen years ago by C. W. Kelsey, President of Rototiller, Inc., who has been responsible for many improvements in adapting the machine to varied American soil conditions. In addition to its use in seed-bed preparation, the Rototiller has been used in road-mix and soil-cement operations. Its revolving steel tines churn the cement or soil-stabilization agent into the soil and mix it thoroughly. The machine will be fitted with different forward and tilling speeds to adapt it to almost all conceivable conditions.

Further information on present models of Rototillers and on their application to post-war highway and airport work may be secured by those interested direct from Graham-Paige, 8505 W. Warren Ave., Detroit 32, Mich.

Diesel Assn. Meets; 1945 Officers Elected

At the annual meeting of the Diesel Engine Manufacturers Association, held December 6, 1944, in Cleveland, Ohio, the following officers were chosen for 1945: Robert E. Friend, President of the Nordberg Mfg. Co., Milwaukee, Wis., reelected to the presidency of the Association; F. H. Kilberry, head of the Atlas Imperial Diesel Engine Co., Oakland, Calif., and E. J. Schwanhausser, Vice President of Worthington Pump & Machinery Corp., Harrison, N. J., Vice Presidents; and Robert H. Morse, Jr., General Sales Manager of Fairbanks, Morse & Co., Chicago, Ill., reelected DEMA's Treasurer. Harvey T. Hill continues as Executive Director.

The following new directors were named: Norris H. Schwenk, President of Busch-Sulzer Bros.-Diesel Engine Co., St. Louis, Mo.; Charles E. Brinley, Chairman of the Board, Baldwin Locomotive Works, Philadelphia, Pa.; Charles G. Cox, Vice President, Enterprise Engine & Foundry Co., San Francisco, Calif.; and F. H. Kilberry. Directors who continue in office are George W. Codrington, Vice President, General Motors Corp., Detroit, Mich. and General Manager of the Cleveland Diesel Engine Division, Cleveland, Ohio; Gordon Lefebvre, President and General Manager, Cooper-Bessemer Corp., Mount Vernon, Ohio; Robert E. Friend; Robert H. Morse, Jr.; and E. J. Schwanhausser.

New Rivers and Harbors Bill Offered in Senate

A new Rivers and Harbors bill, stripped of broad technical provisions which were contained in the proposal presented to but shelved by the old Congress, has been introduced in the Senate. The bill calls for the post-war construction of navigation, hydro-electric power and irrigation works at a cost of about $500,000,000.

Omitted from the current bill are projects duplicating any in the $1,000,000,000 flood-control bill passed by the old Congress. Among these are the Missouri Valley program planned by the Army Engineers and the Bureau of Reclamation, calling for an initial expenditure of $400,000,000; and the Clark Hill reservoir near Augusta, Ga., to cost about $28,000,000. Also eliminated from the bill are the $66,000,000 Tennessee-Tombigbee Waterway, the $400,000,000 St. Lawrence Seaway, the $25,000,000 Santee-Congaree program in North and South Carolina, and the $38,500,000 Beaver-Mahoning Waterway in Ohio and Pennsylvania.

The new bill retains provisions prohibiting interference with irrigation by navigation projects and giving states the right of review over financial programs.

LA CROSSE

HEAVY DUTY MACHINERY TRAILERS FOR ALL PURPOSES

— Made by —

La Crosse Trailer & Equipment Company

LA CROSSE - - - WISCONSIN

Modernization with TELSMITH Steps-up Quarry Plant Output

New intermediate-crushing plant, with 16-B Telsmith Gyratory Crusher and 2-deck 4' x 12' Pulsator Screen

● War plant projects, strategic road construction, airport developments, essential municipal and state highway maintenance in the Reading, Pa. area, imposed new and heavier demands on the Berks Products Corp. rock crushing plant.

To turn out 1500 tons a day *consistently* with an increasingly larger percentage of finer sizes, called for plant modernization. But wartime restrictions meant less manpower and a minimum of new equipment. Yet maximum operating efficiency was built in by using the right Telsmith equipment.

Roundabout handling and material flow bottlenecks were eliminated by relocating the primary jaw crusher down on the quarry floor and building a new conveyor-connected screening-and-intermediate-crushing plant half-way up the incline. Its 16-B Telsmith Gyratory Crusher takes the oversize from a Telsmith 4' x 12' 2-deck Pulsator Scalping Screen located above a 125-ft. bin for 3 sizes of product.

This relieves main plant screen from coarse scalping duty, gives far better classification, and faster, more flexible secondary crushing. And, in the main plant, the installation of a No. 48 Telsmith Gyrasphere Crusher, in closed circuit with the screens, assures top tonnage of fines in all desired sizes.

Planning future modernization, expansion, or a complete new plant? Consult Telsmith engineers. Get Bulletin E-34. Q13

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Engineer Operations In European Theater

(*Continued from page* 19)

bridging, mine removal, and essential road maintenance, water supply, forward demolitions, and special assault work on enemy fortifications as needed.

Behind the Divisions in each Corps, there is one or more Engineer Group, consisting of a Headquarters controlling four Engineer Combat Battalions, one or more Engineer dump truck companies, a topographic company, and any other special units which may be attached from time to time in accordance with the mission of the Corps.

In the Army area are found more Combat Battalions, plus Engineer General Service Regiments with heavier equipment and more trained specialists equipped to do a variety of complex Engineer work. Each Army has an Engineer topographic battalion to print special maps in the field, a water supply battalion, a camouflage battalion, in addition to maintenance and depot companies.

Engineers in the Communications Zone include large numbers of General Service Regiments, port construction and repair groups, port repair ship crews, dredge ship crews, a base topographical battalion, more shop and depot companies, pipe-line companies, gas-generating companies, a model-making detachment, fire-fighting platoons, and many other special troops.

The excellent work done by the RAF and the U. S. Army Air Forces in destroying railroad yards, bridges and rolling stock before D-Day created plenty of work for the Engineer troops as they moved in, but the destruction achieved had been planned for and the Engineers were ready to cope with it.

A 48-Hour Job

General Moore related one dramatic achievement of the Engineers in railroad reconstruction on August 13-15. At that time the break-through had occurred, and our troops were pouring through the Avranches-Coutances funnel into the interior of France and towards Paris. On the morning of August 13, two General Service Regiments, with attached dump truck companies, were working on railroads. On that same morning, General Patton asked to have the railroad leading into Lemans and Laval operating within 48 hours.

This entailed rebuilding seven railway bridges in various stages of demolition, the repair and laying of totally new main lines in three railway yards, laying many miles of new rails approaching the yards and the devastated bridges, and the provision of necessary facilities, such as watering points for locomotives, where these facilities had been demolished. It was a big job even for several months; in 48 hours it seemed almost impossible.

But since doing the impossible is the creed of the Engineers, three additional regiments were rushed to the area, all the heavy equipment that could possibly be spared from other equally pressing jobs was moved to the bridge and yard sites; and day and night the highways leading to the area were jammed with trucks immediately dispatched for essential material and equipment. Even while the bulldozers were clearing away the debris, and troops were moving onto the jobs, Engineer officers, in hastily thrown up drafting tents, were designing new bridges for the job.

As the deadline approached, trains heavily laden with gasoline, ammunition and supplies, moved up past Coutances, into Avranches, and by midnight on August 15 they moved across the last bridge to be completed and on to Patton's fighting men.

SAND'S Aluminum Line & Surface LEVEL

Endorsed and Adopted by Road Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

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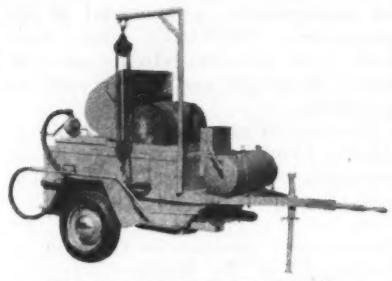
8521 Gratiot Ave. Detroit 13, Mich.

New Heating Kettle Melts Bitumens Fast

A new heating kettle built in capacities from 60 to 300 gallons and with an extremely low center of gravity and easy loading height has been announced by Marvel Equipment Manufacturers, Inc., 224 South Michigan Ave., Chicago 4, Ill. This Marvel Heteseal kettle is mounted on elliptic springs supported



The new Marvel Heteseal kettle.

by a sturdy axle and has 6.00 x 16 4-ply rubber tires. The water and fireproof covers and heavy metal firepot may be removed for easy cleaning.

The sides, top and bottom, all built of heavy sheet steel, are mounted on a reinforced frame of angle iron with electric welded seams. The rockwool insulation is 1½ inches thick, which saves fuel and is one of the reasons why bitumens can be melted in 30 minutes with this kettle with a fuel consumption as low as two quarts per hour.

A catalog on the new Heteseal kettle may be secured direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Airco Personnel News

Several new appointments among the personnel of Air Reduction Sales Co., 60 E. 42nd St., New York, N. Y., have been announced as follows:

H. F. Henriques, formerly Sales Manager of the North Central Division, has been appointed General Sales Manager; J. J. Lincoln, formerly Sales Manager of the South Central Division, has been appointed Director of Sales Services; and C. M. Bloodgood, who has been serving as Sales Manager of the Pacific Coast Division, is now Assistant to C. D'W. Gibson, Vice President in Charge of Sales.

H. P. Etter, formerly Manager of the Los Angeles District, has been appointed Sales Manager of the Pacific Coast Division with headquarters in the Mills Tower Building, San Francisco.

It's the new and improved Huber Roller, whose current performance on wartime assignments foreshadows the role it is destined to play in the nation's road building and maintenance work . . . when the war is won.

THE HUBER MFG. COMPANY • MARION, OHIO, U. S. A.

HUBER ROLLERS

Highlights of New Law On F-A for Highways

Provision for $1,500,000,000 on 50-50 Matching Basis for Three-Year Post-War Highway Program: Allocation By States and Types of Roads

✦ THE Federal-Aid Highway Act of 1944 was signed by the President on December 20, making available $1,500,000,000 in Federal funds for a three-year post-war highway program. With this advance knowledge of the amount of funds available, the state legislatures, forty-four of which meet this year, will be in a position to render such legislative assistance as to permit full participation by the states and their political subdivisions and to assure adequate preparation of the post-war program.

Presidential approval of the measure marks the entry of the Federal government into several new phases of highway work, including the allocation of funds for urban highway improvements, the allocation of funds for a large farm-to-market road program, and payment by the Federal government of one-third of the cost of rights-of-way.

In addition to $225,000,000 annually for three years for projects on the Federal-Aid system, $150,000,000 for projects on the principal secondary and farm-to-market routes, and $125,000,000 for projects on the Federal-Aid system in urban areas, the Act provides $173,250,000 for highway improvements in National Parks, Indian reservations, and other public lands. The funds are to be apportioned among the states on the following basis: Federal-Aid system, one-third area, one-third population, and one-third road mileage; secondary system, one-third area, one-third rural population, and one-third mileage of rural delivery and star routes; urban highways, in the ratio which the population of municipalities of 5,000 or more in each state bears to the total of such population in all states. Funds for construction will be allotted on a 50-50 matching basis, and the appropriations will be available for one year after the fiscal year for which they are made, after which time they will lapse.

Allocation of Funds

Approximate Apportionment of $500,000,000 Federal-Aid Highway Act of 1944
(Thousands of dollars)

State	Federal-Aid Highway System	Farm-to-Market Roads	Urban Highways	Total
Ala.	$ 4,710	$ 3,731	$ 1,310	$ 9,751
Ariz.	3,232	2,235	264	5,731
Ark.	3,855	3,104	561	7,520
Calif.	9,012	5,158	8,166	22,336
Colo.	4,042	2,720	939	7,701
Conn.	1,396	767	1,985	4,148
Dela.	1,097	731	205	2,033
Fla.	3,232	2,165	1,608	7,005
Ga.	5,647	4,309	1,631	11,587
Idaho	2,780	1,945	213	4,938
Ill.	8,858	4,769	9,562	23,189
Ind.	5,408	3,626	3,082	12,116
Iowa	5,582	3,990	1,601	11,173
Kans.	5,667	3,978	1,113	10,758
Ky.	4,200	3,403	1,307	8,910
La.	3,360	2,517	1,540	7,417
Maine	1,948	1,404	564	3,916
Md.	1,832	1,171	1,800	4,803
Mass.	2,942	786	6,649	10,377
Mich.	6,836	4,135	5,713	16,684
Minn.	6,054	4,170	2,218	12,442
Miss.	4,040	3,333	603	7,976
Mo.	6,662	4,564	3,168	14,394
Mont.	4,546	3,106	309	7,961
Nebr.	4,479	3,162	787	8,428
Nev.	2,870	1,923	61	4,854
N. H.	1,097	731	478	2,306
N. J.	2,864	1,042	5,558	9,464
N. M.	3,632	2,515	259	6,406
N. Y.	10,840	4,276	18,878	33,994
N. C.	5,424	4,448	1,501	11,373
N. Dak.	3,355	2,417	216	5,988
Ohio	7,904	4,658	7,581	20,143
Okla.	5,084	3,731	1,356	10,171
Ore.	3,730	2,545	815	7,090
Penn.	9,194	5,276	10,574	25,044
R. I.	1,097	731	1,129	2,957
S. C.	3,046	2,516	658	6,220
S. Dak.	3,532	2,513	223	6,268
Tenn.	4,766	3,667	1,602	10,035
Texas	14,250	10,037	4,488	28,775
Utah	2,532	1,686	436	4,654
Vt.	1,097	731	187	2,015
Va.	4,113	3,190	1,499	8,802
Wash.	3,542	2,398	1,475	7,415
W. Va.	2,470	2,078	812	5,360
Wis.	5,416	3,668	2,669	11,753
Wyo.	2,799	1,899	134	4,832
Hawaii	1,097	731	396	2,224
D. C.	1,097	731	1,153	2,981
Puerto Rico	1,110	1,133	839	3,082
Admin. and engg.	5,625	3,750	3,125	12,500
Total	$225,000	$150,000	$125,000	$500,000

New York State will receive the largest appropriation, with a total of approximately $34,000,000 each year, while Texas and Pennsylvania are next, with $28,000,000 and $25,000,000 respectively.

One interesting provision of the Act is that the Commissioner of Public Roads may advance the Federal share of the cost of projects in order to expedite work, *except in those states which divert highway-user revenues* in violation of Section 12 of the Hayden-Cartwright Act of June 18, 1934.

Interregional System

The 1944 Highway Act requires that state highway departments cooperate with adjoining states in designating a national system of interstate highways (the Interregional System) not exceeding 40,000 miles in total extent. All mileage in this national system of highways which is not now on the Federal highway system automatically becomes a part of that system. Each state will be responsible for the initial designation of the sections of the Interregional System within its borders and the state designations will be coordinated into a national system, possibly through group and regional meetings of state highway department officials with representatives of the Public Roads Administration.

A Word of Caution

Sudden death may stalk the nation's roads if the plans for 75-mile-an-hour highways are carried out in the post-war road program, M. J. Julian, President of the Better Vision Institute, warned recently. Referring to the Interregional System of highways to be designed for "speeds not less than 75 miles an hour", the development of which was authorized by the recent Act, Mr. Julian points out that there are millions of automobile drivers whose eyes cannot function rapidly enough to drive safely at such speed.

Out of picked men who applied for service in the Air Corps, it is reported that approximately one out of four was rejected as unqualified because of visual shortcomings. Those interested in highway safety should certainly give careful consideration to the facts about vision that have been developed in the aviation field, Mr. Julian said, pointing out that if land travel, with its many visual distractions, is to be pushed to higher speeds, clearly there is need for intensive study of visual requirements and more exacting visual qualifications of motorists. "You cannot put millions of drivers with '40-mile-an-hour eyes' into 90-mile-an-hour vehicles on 75-mile-an-hour highways without disastrous results," he concludes.

ARBA Appoints Gregg To Public Relations Post

On the eve of the Forty-Second Annual Convention of the American Road Builders' Association, Norman W. Gregg took over the post of Director of Public Relations for the Association. For the past three years Mr. Gregg has been Director of Publicity for Advertising Producers—Associated, Chicago. He also has a background of editorial work on several middle western newspapers.

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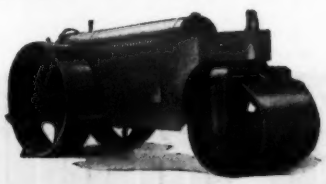

Portable

Tandem

Sewer Repaired

(*Continued from page 1*)

Railroad, although also used by the Pennsylvania, the Baltimore & Ohio, and Chesapeake & Ohio Railroads. These lines have their terminus in Detroit at the Union Station a few blocks to the east.

Old Sewer Failing

The old sewer was well constructed, consisting of two rings of red brick with a 6-foot vertical axis and a 5-foot horizontal axis. The twin barrels were laid side by side and were flush at the spring line. They are located 5 and 11 feet off the center line of 24th Street which has a 26-foot-wide brick pavement. Clearance between the top of the sewer and the railroad ties at the crossing is only 2 feet. The old sewer was supported on wooden piles with wooden caps, and on the sides were wooden studs and wales which practically encased the twin structures in a box. Across the top and bottom were 1¼-inch round wrought-iron tie rods.

A Detroit sewer inspector, while on a periodic trip through this tunnel, noticed that for the 70-foot section beneath the tracks there was about a 2-inch deflection at the crown, and also a failure of the bricks at the spring line where they had been moved as though subjected to lateral pressure.

The City notified the Railroad of the condition and possible danger to railroad traffic. Pending determination of whose responsibility it was to make necessary repairs, the Pere Marquette Railway, fearing the collapse of the sewer and the resultant tie-up of its main line, moved to the site eight 30-inch I-beams, 35 feet long, and a number of 12 x 12-inch wooden stringers 15 feet long with which they expected to bridge the sewer should it suddenly fail.

Liner Plates Used

The Railroad finally decided, with the City's approval, to repair the old sewer by lining it with No.7-gage Armco galvanized liner plates, four plates to a ring, which would form an elliptical section with a vertical axis of 69 inches and a horizontal axis of 56 inches. Two similar plates were used for the top and bottom sections of the ellipse and have an inside radius of 25 inches. The two similar side sections have an inside radius of 42¼ inches. The sections are 18 inches long and are joined together by a 3-inch lap joint with four ⅝-inch galvanized bolts spaced 4-7-4 inches apart. These plates are fabricated with 6 x 1¾-inch corrugations. Around the peripheral flange of the section are ⅝-inch round holes spaced 12 inches on centers which were used in bolting the plates together as the tunnel advanced. The plates are coated with asphalt.

Preparation for Lining

Access to the sewer barrels for the repair work was made through an opening in the pavement and the crown of the sewer immediately south of the south line of the railroad right-of-way. Barricades were erected and one half of the street closed to traffic. Work was begun on the west sewer first and the tunnel lined from south to north.

The sewer ordinarily runs about half full so bulkheads of sand bags were placed at each end of the section to be repaired in order to divert the flow through the other twin sewer by backing the water up to the Jefferson Street interceptor. About seventy-five bags were used at each bulkhead in layers of four on the bottom, then a layer of three bags, and finally a layer of two bags across. The north bulkhead prevented storm water from entering the sewer while the south bulkhead prevented the Detroit River, which is only 430 feet to the south, from backing up into the construction. The river is level with the spring line of the sewer at the outflow. The water was pumped out by two 2-inch Jaeger pumps, and thereafter one pump was kept running to take care of seepage past the bulkheads and surface water which entered the sewer from the railroad drainage.

Since the old brick section was egg-shaped and the new section is elliptical, a single course of brick had to be removed from the tunnel from the spring line around the invert to make room for the plates. Also the deflected brick section in the crown had to be removed. A Thor and an Ingersoll-Rand jackhammer with 1-inch drills were used to remove the inside ring of bricks so that the liner plates would have a clearance of at least 1 inch. In this way the flow line at the invert grade was not altered.

In advancing the tunnel, the top section of plate was bolted first, followed by the two side plates and lastly by the invert. The plates were designed with staggered horizontal joints so that the lap joint would not fall in one straight line through the tunnel.

Grouting

The 1-inch clearance between the outside of the liner plates and the existing brickwork was filled with a 1:2 cement-sand grout, placed under pressure. Two-inch holes were drilled at 10-foot intervals in the top sections of the liner plates through which the grout was forced. Grouting began when about 30 feet of tunnel had been constructed. The 1-inch opening between the plates and the brick at the south end of the tunnel was plugged with gunny sacks. Then

(*Concluded on next page*)

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ARMY E NAVY

Sewer Repaired

(Continued from preceding page)

grout was pumped into the first 2-inch drilled and tapped hole located 5 feet from the end of the tunnel. Two-inch iron pipe led from the Ransome grout machine set up in the street down the shaft and through the tunnel. The pipe was cut and threaded into suitable lengths with a Ridgid No. 2 heavy-duty pipe cutter and a Ridgid No. 65 pipe threader.

Even if not used for the purpose intended, the 30-inch I-beams moved to the site by the railroad proved to be of definite value, for the construction crew inserted the 2-inch pipe between the webs and used the beams as a vise with which to bend the pipe to the proper angle to enter the tunnel. The pipe ran along the roof of the tunnel about 1 foot below the top and was supported on 2 x 8's wedged against the invert.

The sand used was stockpiled; cement came in 94-pound paper sacks; while the water was tapped from a nearby hydrant and brought to the grouting machine in a 2-inch iron pipe. Two rubber-tired wheelbarrows were used in preparing the grout, one for the cement, and the other as a reservoir for the water. Two men each threw a shovelful of sand into the grouting machine while a third added a shovelful of cement; a fourth added water dipped from the wheelbarrow with a bucket. The grout was mixed by air admitted into the bottom of the machine. A Sullivan WK60 portable compressor with a capacity of 105 cubic feet supplied the air for the grouting machine and the drills.

When the grout was thoroughly mixed, the air line was turned off at the bottom of the machine and pressure turned into the top and the grout blown out through the bottom into the 2-inch line and on into the tunnel. The grout was pumped until it was forced from the next hole in the roof 10 feet further on. The machine was then shut off, the first hole closed with a 2-inch metal cap, and grout then pumped into the next hole along the line.

Paving the Invert

The invert was paved so that any debris which might enter the tunnel would slide along easily. A concrete pavement, reinforced with a No. 8-gage 4 x 4-inch welded wire mesh in 6-foot widths, was laid. The mesh was fastened with wire to the bolts of the liner plates. The paving material filled up the 1¾-inch corrugations in the plates and extended ¾ inch above the mesh.

A Ford 1½-ton truck was used as a service truck for hauling on the job. Two Master 120-volt alternating-current generators were used to light the tunnel.

Personnel

Work on this project for placing steel liner plates in 70 feet of sewer tunnel in Detroit, Mich., was started on August 25, 1944, and completed by the end of September, employing eight men in two 12-hour shifts from 8 a.m. to 8 p.m. and from 8 p.m. to 8 a.m. Oscar Poe was Superintendent in charge of construction for Armco Drainage & Metal Products, Inc., Middletown, Ohio, while A. R. Dewees is Division Engineer for the Pere Marquette Railway, with O. E. Hager, Engineer of Bridges and Structures. H. M. Johnson was Inspector for the City of Detroit.

Auto Travel Still Leads

Passenger automobile transportation still leads all other means in spite of wartime restrictions, according to a recent item in *Highway Highlights*. In 1943, Americans traveled 280,000,000,000 passenger-miles in private automobiles, as compared to 87,980,000,000 on steam railroads, 54,864,000,000 on buses, 35,400,000,000 on electric railways, and 1,606,000,000 on domestic airlines. Although still in the lead by comparison with other transportation, automobile mileage for 1943 shows a sharp decline in comparison with the all-time high of 501,000,000,000 passenger-miles traveled in private automobiles in 1941, while all other passenger transportation exceeds the 1941 figures.

These data were compiled by H. E. Hale, publisher of Hale's Transportation Charts, from various sources.

New Post-War Floors For Shops and Garages

A 16-page illustrated brochure describing a new permanent acid-proof brick floor which will not crease, groove, chip, dust off, or require patching has recently been issued by the Belden Brick Co., Canton, Ohio. Designed for use in machine shops, garages, and factories, this type of floor is bonded with acid-proof cement and repels organic, physical, and chemical attack; holds up under the action of steel-wheel trucks; resists oil, water, and acids; and has a crushing strength of 18,500 pounds per square inch, according to the manufacturer. Easy to flush clean, the bricks are furnished with smooth or non-skid surfaces.

The brochure gives complete details on this new type of brick, with complete instructions for installation. To support the advantages claimed for its new floors, the Belden Brick Co. has reproduced technical analyses made by three testing laboratories, showing minimum absorption, and high resistance to sudden temperature changes, acids, and heavy impacts.

Copies of this brochure on Belden brick floors may be secured by interested state and county highway engineers and by contractors direct from the company. Just mention this item.

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ECONOMY STEEL FORMS

How Lake County, Ill., Builds Its Black-Top

County Gravel Pits Worked By Own Forces to Supply Commercial Plant With Aggregate for C-6 Mix

ECONOMICAL bituminous pavements on gravel bases, utilizing natural gravel deposits to achieve a smooth-riding durable surface, have been a feature of the secondary-road program of Lake County, Ill., since 1938. Forty miles of low-cost pavement have been constructed in the six years since C-6, as this type of surface is generally called, was adopted for use by this county lying in the northeast corner of Illinois. In 1944 a 4-mile stretch was built in Grant Township in the west central part of Lake County just east of and parallel to U. S. 12.

These secondary roads are built with the same regard for sound engineering principles as are other types of State-Aid highways. The alignment of the existing road is not adhered to if a better route can be secured, nor is the existing base used in its original state as a foundation for the new road. A roadway width of 40 feet between edges of shoulders is maintained.

Base Preparation

To prepare Grant Township road for 1944 surfacing, the old gravel road was opened up in 1943 by county forces with a scarifier and tractor and then leveled off with a power grader. On top of this graded base a 7-inch compacted course of crushed bank-run gravel, hauled by trucks from county stockpiles, was placed. Not more than 8 per cent clay was permitted in this gravel, 100 per cent of which passed a 1-inch screen and between 50 and 60 per cent passed a No. 4 sieve. The 22-foot base course, for a 20-foot roadway, was laid in three 2½-inch layers. Each layer was spread by a power grader for the entire length of the improvement before gravel for the next layer was dumped on the road. No rollers were used as the required compaction was obtained with normal road traffic.

The laying of the base was done by county day-labor forces in the summer of 1943 so that traffic through the autumn, winter and following spring thoroughly compacted the gravel before the surface pavement was placed. The cover coat is never placed on top of a base course in the same year.

During the winter months of 1943-44, day-labor crews using a 20-year-old crusher processed the gravel for the surface course and stockpiled it. Not more than 2½ per cent of silt or clay was allowed in the gravel which was within the following specified gradation:

Sieve Sizes	Per Cent
Passing 1-inch	100
Passing ¾-inch	95-100
Passing ½-inch	70- 90
Passing No. 4	45- 65
Passing No. 10	40- 55

The portion of aggregate passing the No. 10 sieve fell within the following gradation:

	Per Cent
Passing No. 10, retained on No. 40	40-75
Passing No. 40, retained on No. 200	15-45
Passing No. 200	0-15

Cover Coat

The following June, when the moisture had dried out of the base course, it was primed for its full length with 16,168 gallons of MC-3 asphalt at the rate of 0.3 gallon to the square yard. A pressure distributor sprayed the prime through a 22-foot bar which provided an extra foot on each side of the 20-foot finished roadway. The prime coat penetrated the base to a depth of about ½ inch and was allowed to cure for at least 24 hours before the cover coat was laid.

This cover coat consists of a 2½-inch compacted layer of the gravel processed during the winter, and which was mixed at a commercial plant with MC-4 asphalt at the rate of 10 gallons to a ton of aggregate. The asphalt was heated to a temperature, usually 200 degrees F, at which it was workable with the gravel. The plant-mix material was hauled to the job in trucks and delivered through the tail-gates to a bituminous spreader which laid the mix on half the pavement width at a time. Compaction was secured by an 8-ton tandem roller. This C-6 course used 68,590 gallons of MC-4 in the plant-mix which covered 49,000 square yards of road surface.

Seal Coat

The cover coat was put on in a week, whereupon traffic was permitted over the surface for three months during which time the new surface course got a thorough kneading. In the early part of October, 1944, the surface was sealed with 12,248 gallons of MC-4 asphalt applied by a pressure distributor using a 20-foot bar at the rate of 0.25 gallon to the square yard. The bituminous material was then covered with "torpedo" sand with the following gradation:

	Per Cent
Passing ⅜-inch sieve	100
Passing No. 4 sieve	95-100
Passing No. 8 sieve	70- 90
Passing No. 16 sieve	45- 70
Passing No. 50 sieve	5- 20
Passing No. 100 sieve	Not over 5

The sand, which sealed the surface tightly, was applied at the rate of 10 pounds to the square yard by two Buckeye spreaders pushed backwards by trucks unloading the material through their tail-gates and which together covered the full pavement width. Traffic was detoured over the 10-foot shoulders during the sanding operations. The surface was next broom-dragged, rolled by a 4-ton tandem roller, and then opened to traffic. The seal coating on this 4-mile job took only two days.

The road work was all done with county day-labor forces but the asphalt was supplied, through a low-bid contract

(*Concluded on page 87*)

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The highway profession faces the task of providing for a post-war program that will meet the nation's economic needs. The annual program must be in BILLIONS if it is to fulfill this purpose. Every Highway Department should have a program *complete with plans, specifications, and cost-estimates.*

Little plans will not get rid of worn-out, obsolete roads and streets, unsafe bridges, and traffic congestion. Little plans will not build express highways between cities, or arterial routes into and through cities. Little plans will not provide the sound program, based upon the nation's economic needs and actual highway needs, which will pay dividends far beyond the cost. Make no LITTLE plans!

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Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Trespassing on Utilities In Tunnel Construction

The liability of a sewer tunnel contractor for damage done to an electric light company's nearby conduits was the subject of a decision by the Massachusetts Supreme Judicial Court in the case of United Electric Co. v. Deliso Construction Co., 52 N. E. 2d, 553.

The damage was caused in the course of cement grouting operations conducted by the construction company. The grout was forced through holes in steel plates, put in place as the tunnel progressed, under a pressure of 50 pounds per square inch, and some of it escaped into manholes and conduits forming part of the electric company's underground system. The court decided that the trial judge erred in not leaving it to a jury to determine whether or not the construction company wrongfully disregarded the rights of the electric company. The court said:

"The defendant had no more right to injure this underground system because it was personal property than it would have if it had become a part of the realty. The plaintiff and the defendant were each lawfully occupying a portion of the underground area of a public way, and the duties owed by one to the other were in the main no different than if they occupied adjoining parcels on the surface of the land. * * *

"The projection of the grout upon the plaintiff's property could be found to arise from an unreasonable use of the land occupied by the defendant and to have constituted a wrong toward the plaintiff."

Oral Changes in Contracts

In primitive days when making a "written" contract meant chiseling the terms in a block of stone, there may have been some excuse for "gentlemen's agreements". But the present low cost of ink and paper ought not to influence even the proverbial Scotchman in the direction of leaving business agreements recorded in mental "sand" where they can be washed away by forgetfulness or a dishonest disposition to claim that the understanding was different from what it actually was.

In all states it is highly *desirable* that all commercial contracts be in writing and signed. Where an original contract is in writing, any modification of it should likewise be put down in black and white. In some states, certain unperformed contracts are not enforceable unless in writing, and in some a written contract, whether or not required to be in writing, can be modified only by a written instrument.

In the case of Barnard-Curtiss Co. v. Maehl, 117 Fed. 2d, 7, the United States Circuit Court of Appeals, Ninth Circuit, dealt with an interesting phase of a construction contract. One of the parties claimed that there had been an oral *cancellation* of the contract, which was in writing. The governing law—a Montana statute—declared that an unperformed written contract could not be "altered"—that is, could not be *modified*—by oral agreement. But the court decided that the statute did not prevent *cancellation* of a contract by oral agreement, because a *cancelled* contract is not an "*altered*" contract.

Plans and Spex, Not Spex Alone, Make Up Contract

A sewer contractor was denied extra pay for the construction of a cradle for the support of pipe in soft ground, although the specifications were silent on this phase of the work. The United States Circuit Court of Appeals, Second Circuit, in the case of Middlewest Construction, Inc. v. Metropolitan District of Hartford, Conn., 133 Fed. 2d, 468, based its decision on the fact that the work was indicated on the plans forming part of the contract. Said the court:

"Although the specifications do not describe performed cradle construction and say nothing about allowing time for the cradle to harden, the blueprint plan shows this type of construction, and the specifications provide that the plans and specifications are intended to be cooperative and that all works necessary to the completion of the contract shown by the plans are to be considered as properly described in the specifications. The district judge was of the opinion, and we agree, that "the blueprint" makes it sufficiently clear that the cradle of Type C construction would have to be performed. The engineer so interpreted the specifications and plans and the contractor made no objection at the time the work was performed that it was an extra or would delay completion of the contract."

The last quoted remark of the court suggests that it is always desirable that a contractor promptly speak up when he is asked to do something which he regards as being outside his contract if he ever intends to assert that it is an extra for which he is entitled to extra pay.

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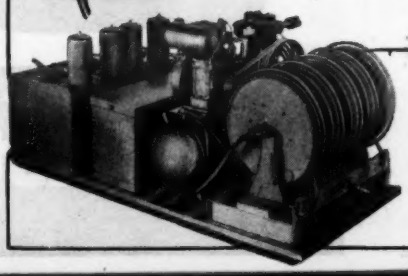

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Plan War Memorials For Lasting Service

Memorials Can Be More Than Stone and Bronze; They Can Combine Service With Commemoration

THE value of well planned living memorials to the heroes of our nation has been recognized generally since World War I. The end of the present conflict can mark the beginning of a new era in memorial creation, which, if properly organized and administered, will result in many worthwhile roadside memorials of lasting beauty and service.

One of the most difficult problems to be solved by the heads of highway departments and park departments during the coming post-war years will be the selection, acquisition, and development of areas of land for war memorials. Such memorials throughout our nation have changed with the periods of our history. Shafts and columns, pyramids of cannon balls, and generals on horseback set up after the war between the States were forms never again repeated. The Confederate or Union soldier standing in stone at the entrance to a Virginia or Vermont town represents an older period. The bronze "doughboy" which replaced him and the World War I cannons and tanks now rusting on the green in front of the new county courthouse are already old and strange to our modern ways of living.

Following the first world war, the sculptor and the stone cutter were still in charge of war-memorial development but certain new conceptions of the memorial idea began to grow. There is a very limited literature relating to memorial design, but there is enough to show that most of those who have studied the memorial problem have come to rather definite conclusions.

There is a growing belief that war memorials should combine the qualities of commemoration and beauty with that of utility. The best memorials of the future will, it is believed, be located and designed to play a part in the daily lives of men and women. Some of the best of our World War I memorials commemorate, not individuals, or even individual military units, but men of a whole armed service or of the three armed services. Impressive memorials to the "Unknown Soldier" in this and other countries are the culmination of this idea.

Parks and Plazas

Some of the finest existing memorials take the form of parks, of planted groves or avenues of trees, of public plazas and parking spaces, or of whole highways and parkways. These areas, or perhaps more frequently specially selected and designed portions of them, represent our best models for World War II memorial development.

The best memorials have been placed where they are seen and used by the people of a community as part of their daily lives, or by drivers along a highway during every journey. Memorials do not depend for their effectiveness upon their size or the large amounts of money expended on them, but on the "spirit of the memorial" as this spirit is interpreted by the designer in terms of usefulness, permanent and beautiful materials, and the wise arrangement of available space.

In urban areas, memorials will be a combined product of engineering, landscape architecture, architecture, and the sculptor's and stone cutter's arts. Good taste in design, planned grading, and careful selection and use of stone, flowering plants, trees, and other materials will be essential elements in our future successful urban memorial development.

In open-country areas, such as roadside parks, the memorial spirit may often be best expressed in a fine natural setting, which the memorial is designed to preserve. Fine old trees, a shore line, a point from which a fine mountain, prairie or ocean view can be seen, such landscape values represent "the heart" of an open-country memorial. Structures on roadsides or other country memorial areas should be subordinated to the landscape, and not featured as they may well be in urban memorials.

Successful memorial development will, by and large, depend upon the employment of competent landscape architects with imagination, training, experience, and the ability to cooperate with the engineers, architects, and contractors in construction matters, and with the sculptors, if any, in matters of art. Such a designer must, it goes without saying, have, or be able to obtain, the cooperation of all individuals and organizations interested in memorial development in each community or locality.

Memorials in Urban Communities

Memorials in towns or cities may take the form of memorial streets and avenues, provided there is an adequate 10 to 12-foot space for tree planting between the curbs and sidewalks, with long-lived trees, suitable under prevailing climatic and local atmospheric conditions, planted in the spaces. Parking areas and plazas in cities, towns and villages can be designed as memorials. The locations must be selected to meet the requirements of the spirit of the memorial. Thus a parking area in an industrial portion of the city would logically be a memorial to service men joining the armed forces from nearby industries, business, or trade centers. A plaza on a hilltop site overlooking a harbor or naval establishment would be a fitting place for a memorial to Navy personnel and officers, etc.

Well designed small urban parks may be favorable sites for memorials. Opportunity for rest, shade, and, where possible, running water in basins and fountains are types of features of successful memorial park use. Flowering trees and masses of flowering shrubs are also featured in such small urban parks, with

(*Concluded on next page*)

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The rigging for a typical cargo ship requires over 11,000 feet of wire rope, ranging in size from ¼ inch to 2¼ inches, and weighing over 10 tons. Scores of shipyards are building such ships—and using plenty of tough, dependable Wickwire Rope.

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Since wire rope is harder to get, each length must be made to last longer. WISSCOLAY *Pre*formed Wire Rope, manufactured by Wickwire Spencer, not only lasts longer, but it's kink-resistant—easier to cut, splice and install—safer to handle.

If you have a wire rope problem our wire rope engineers will be happy to be of service. Call or write our nearest branch office or Wickwire Spencer Steel Company, 500 Fifth Avenue, New York 18, N. Y.

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Dependable Products Since 1873

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Plan War Memorials Along Our Roadsides

(*Continued from preceding page*)

the addition of appropriate memorial tablets or other memorial structures as a central point of interest.

Architecturally attractive bridges and grade-separation structures at entrances to cities and towns can be given memorial significance by the use of tablets and other appropriate markers. Municipal piers, docks and causeways may be similarly adapted to memorial purposes by the use of appropriate markers or tablets. Community water works and dams offer locations for appropriate memorial markers or tablets commemorating men of the several armed services who may, for example, have been recruited from the city and its environs. Overlook or outlook points in connection with dams and reservoirs are frequently marked with effective memorial tablets.

Memorials and Roadsides

There are numerous types of memorials which may well be dedicated to men of an army, of a whole division, or of the fleet or air service in residential suburbs or on open-country roadsides. These include parkways, freeways, other memorial highways, state and county parks, state or county forests, major dams, reservoir lakes, and lakeshore drives, airfields and airports, Flight Strips and airparks, public schools, and athletic fields.

Smaller memorials might be dedicated to individual units of the armed services, or to men of the highway departments, or to service men from a nearby village or town. These memorials may be roadside parks not exceeding one or two acres, parking areas and turnouts located to conserve and take advantage of a group or grove of existing or planted trees, hillsides or ravines covered with masses of spectacular flowering or desert growth, knolls, ridgetops, or mountain passes, from which outstanding views may be seen, seashores, lakeshores, streamshores, sand dunes, and weathered rocky cliffs, swamps and marshes, and promontories on lakes or on the seashore.

Roadside Memorial Parks

Roadside memorial parks in open country, not exceeding one to two acres, should be designed to conserve existing fine trees, flowering growth, views, shore lines, and to develop the memorial quality, using only incidental structures necessary for public use. There should be safe, convenient access and egress from the main road, and parking space for vehicles must be provided. The driveway leading into the park and the parking space should be gravel surface or hard surface. Masonry structures of dry stone or weathered field stone in mortar masonry should be subordinated to the natural features. Tablets may be placed on natural boulders and ledge rock to inform the user of the park of its memorial nature, but the park should be devoid of statuary, fountains, formal pools, trimmed hedges, etc., and the planting should be entirely informal, using native materials, and mainly native high-head trees. The use of lawn-type grass areas is to be avoided in favor of meadow-type turf and natural woody ground covers. No roses, flowering perennials, or any exotic growth should be planted.

Creosoted round timber bumper rails, guard posts, or natural weathered stone should be used in the parking spaces, and curbs, sidewalks and concrete paved drives and gutters should be eliminated. The design of the drainage system should use rounded slopes grading into natural contours, and drainage channels and all gutters should preferably be of turf. The water supply should be developed from springs, streams, etc., if free of pollution.

After this war, local memorial committees who are considering the development of highway or roadside war memorials will need the friendly advice and cooperation of highway administrators, and the engineers, architects, and landscape architects whom they employ. Working together we can have war memorials of lasting service on the highways and the roadsides of every state.

This article is prepared from a Report on Highway War Memorials compiled by George B. Gordon, Landscape Architect, Public Roads Administration, for the Committee on Roadside Development, Highway Research Board, and from "Living Memorials", a pamphlet prepared by The American Association of Nurserymen, at 636 Southern Building, Washington 5, D. C. Copies of the pamphlet will be furnished gratis to those interested.

Wrong Brake Fluids Ruin Truck Braking

Owners and drivers of trucks and automobiles are warned by the Automobile Manufacturers Association against the use of unapproved petroleum-base brake fluids in the hydraulic braking systems of their vehicles. Brake failures and accidents will result if harmful oils are used in the brake lines. This warning has been given because it has been learned that large quantities of a special petroleum-base brake fluid, designed for use *only* in military aircraft, has been offered for sale as surplus recently by the Government.

Swelling of the rubber cups in master brake cylinders and deterioration of the flexible hose lines can result in a few days if even a few drops of petroleum oil are used in the braking system. Truck users are advised that careful cleaning and examination of the brake system, plus replacement of all rubber parts, will be required in any instance where petroleum fluid has accidentally been used. The effects of the petroleum are to swe the rubber parts and make them spon and weak, completely spoiling their e fectiveness. The safe types of automo tive brake fluid usually have a castor oil base, which does not have a deteri rating effect on rubber parts.

The special petroleum-base fluids f aviation equipment have proved satisfa tory in airplanes because the brake ho and similar parts in aircraft are made synthetic rubber which withstands th effects of oil. Thousands of gallons the aircraft-type petroleum-base flui may already have passed into the hand of jobbers, dealers, and service station throughout the nation. Garage men hav been warned not to use these fluids passenger cars or trucks.

Additional fear has been expresse that the destruction of rubber parts the braking system of automobiles wi create a demand for natural rubber part which cannot be met during wartime. The destruction of the cups and ho lines made of natural rubber might force many cars and trucks off the roads.

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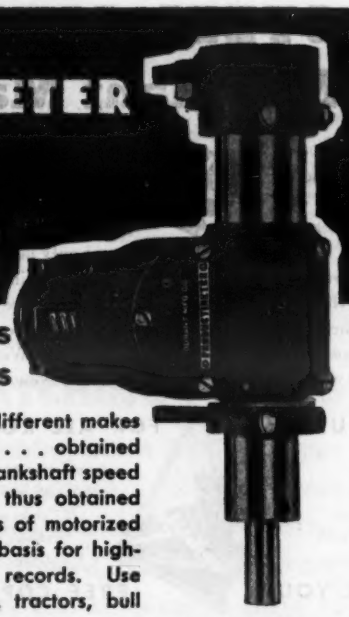

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Hour Meters, for direct application on different makes of engines, register hours of operation . . . obtained through the conversion of an average crankshaft speed into hours of running time. Readings thus obtained are invaluable to owners and operators of motorized construction equipment, and provide a basis for highest efficiency maintenance and service records. Use them on compressors, mixers, graders, tractors, bull dozers, crushers, pavers, road rollers.

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For distributor equipped engines with SAE type A or B distributor mounting.

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A useful type of trap to remove water from a fuel line.

Simple Device Traps Water in Fuel Lines

Equipment using either butane or diesel fuel cannot operate satisfactorily if water is present in the fuel supply, and the amount of damage caused by water may range from a brief shutdown to possible loss of a cylinder head or complete ruin of the power unit. Carl Short, Inc., Houston, Texas, has equipped his elevated fuel storage tanks with a simple settling device which effectively permits separation of water from the fuel by gravity.

The flow line from the tank enters a section of 6-inch pipe, the nipple extending some 18 inches down into the trap unit. At the side of the top, the fuel line again takes off, continuing through an "L" and drop leg to a connection with the engine lines. The base of the separator is equipped with a short run and a valve for bleeding off accumulated water and dirt, while a plug on the opposite end of the "T" permits a thorough clean-out if the valve becomes plugged.

More "E" Awards

Several companies in the construction equipment and material field have received additional Army-Navy "E" Awards recently.

The Chain Belt Co., Milwaukee, Wis., has just been awarded a third white star for the Army-Navy "E" pennant first given to that company in September, 1942. In addition to its regular line of construction equipment, Chain Belt has produced since 1941 howitzers, anti-aircraft guns, field guns, refuse grinders for transports and landing barges, tank turrets, ammunition hoists and other items for the armed forces.

The Davey Compressor Co., Kent, Ohio, recently received a second white star for its Army-Navy "E" pennant for its continued high production of compressors, power take-offs, and pneumatic saws, as well as for specialized units for the armed forces.

LaPlant-Choate Mfg. Co., Inc., of Cedar Rapids, Iowa, has received for the fourth time the Army-Navy Production Award for outstanding achievement in the development and production of equipment essential to the war effort. This entitles the company to a third star on its "E"-Award flag. Among the LaPlant-Choate products are the tank-dozer, beach-dozer, air-borne calf-dozer, and the pivot-dozer or trailbuilder, in addition to the regular bulldozer. The first three are wartime specialties developed in cooperation with the U. S. Engineers and Ordnance by LaPlant-Choate who is the exclusive prime contractor.

For the third time since the autumn of 1943, the Raybestos Division of Raybestos-Manhattan, Inc., Bridgeport, Conn., has won official recognition for its record in the production of war equipment, adding a second white star to its pennant.

In recognition of its outstanding production record in building power cranes and shovels for the armed forces, the Thew Shovel Co., Lorain, Ohio, was recently presented with the Army-Navy "E" Award. F. A. Smythe, Thew President, who accepted the "E" flag, was largely responsible for the development of the truck crane in 1918, as a result of the need of the American Expeditionary Forces in France. This was the forerunner of today's Moto-Crane which is one of the most widely used units of the armed forces and represents a large part of Thew's production.

The Trackson Co., Milwaukee, has received a second white star for its record in the manufacture of tractor equipment, gun mounts, and special equipment.

A fourth star for its Army-Navy "E" pennant has been awarded to the Tyson Bearing Corp., Massillon, Ohio. In view of this company's excellent war-production record it is entitled to retain the flag for a year before being considered for renewal.

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Superior Features

1. Constant Voltage
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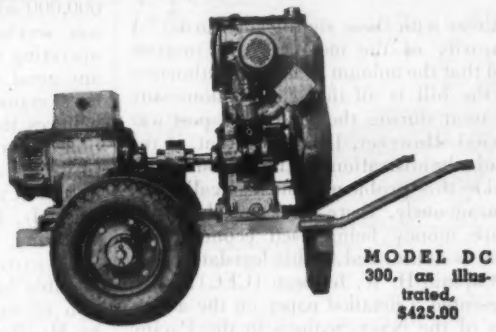

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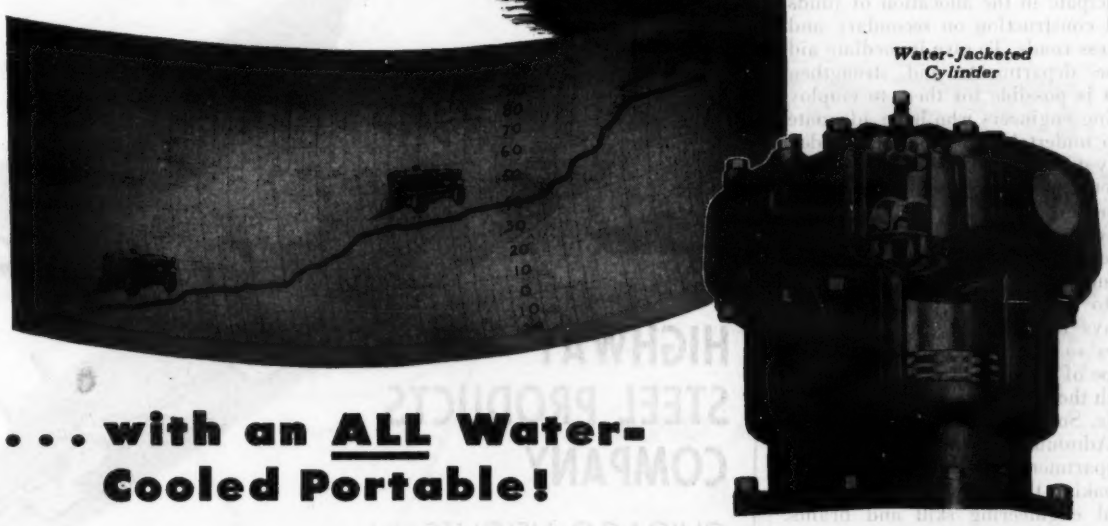

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Hot weather . . . cold weather, it makes no difference in the operating efficiency of a Gardner-Denver "all water-cooled" Two-Stage Portable Compressor. Its completely water-jacketed compressor cylinders keep cool in summer . . . warm in winter. Temperature or altitude extremes do not reduce its capacity or limit its operation. Hot or cold, it keeps right on delivering.

"All water-cooling" has other exceptional advantages. Discharge temperatures are lower... effecting considerable savings in oil consumption and in valuable air hoses. High efficiency is sustained . . . air output is higher . . . horsepower requirements lower. And Gardner-Denver "all water-cooled" portables require no pampering, regardless of operating conditions.

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GARDNER-DENVER Since 1859

ARBA Meeting

(Continued from page 58)

address with these significant words, "A majority of the members of Congress feel that the amount of money authorized in the bill is all that can economically be used during the three-year post-war period. However, I feel sure that, if the road administrations of the various states tackle this problem enthusiastically and courageously, there is a possibility of more money being used economically than is authorized in this legislation."

Captain H. W. Johnson (CEC), USN, presented a detailed paper on the activities of the Navy Seabees in the Pacific where his assignments in the past two years called for the construction of bases and other installations at many important strategic points.

Hal G. Sours, retiring Director of Highways of Ohio, spoke at some length of the benefit that will accrue to the local highway departments of the counties and cities through the new Federal-Aid bill. It was Federal-Aid that first prompted the establishment of the present strong state highway departments by encouraging those that were already well organized and aiding the weak to become strong. Similarly, he feels that the weaker county and city highway departments will be encouraged to build stronger engineering organizations so as to be able to participate in the allocation of funds to local construction on secondary and city access roads. To give immediate aid to these departments and strengthen them, it is possible for them to employ consulting engineers who have adequate staffs to undertake the planning needed for early construction. This will also prevent over-expansion of the local highway departments.

The states can unite contiguous city and satellite community highway departments into a metropolitan authority with power to advise in the planning of expressways through the group of communities so as to select the most desirable type of urban highway development of which the expressway is the most general. Mr. Sours believes that the Public Roads Administration and the state highway departments should assume leadership, making the maximum possible use of local engineering skill and brains. There should be as much use of existing highway locations as is possible where the expressway may not be necessary, and thus salvage the local street system.

At the luncheon meeting on January 17, Jesse P. Wolcott, ranking minority member, House Committee on Roads, spoke extemporaneously on the economics of the road program and post-war construction. He said that fortunately we have passed the point where we think we must build roads to provide jobs, because we now know that we must build up the national and international economy, no matter what the labor market may be.

Construction-Equipment Picture

The afternoon session suffered from the illness of one speaker and the inability of another to be present because of weather conditions in New England. Sidney J. Williams, General Manager, National Safety Council, presented one of his usual factual and inspiring papers, this time on "Building Safety Into Our Highways".

This was followed by an interesting discussion of the "Construction-Equipment Picture" by W. A. Roberts, Vice President, Allis-Chalmers Mfg. Co., in which he stated emphatically that the construction-equipment industry has no reconversion problem and will be ready to direct its current production of road-building machines to contractors the moment the government stops taking them direct from the production lines. That the manufacturers will be able to meet all demands for equipment is indicated by the figures of production in 1939 and 1943. In the former year, manufacturers produced $200,000,000 in machines for peacetime construction, while in 1943, the same manufacturers produced $800,000,000 of the same machines, but for war service. This was done mostly by operating at full capacity rather than by any great expansion of the entire industry's manufacturing plant. Mr. Roberts believes that any discussion of disposition of surplus equipment must wait until we know how much there is, where it is, and in what condition it is. Until then, said Mr. Roberts, there is no need of worrying.

Of particular significance are the two possible harmful effects of the disposition of surplus equipment brought out by Mr. Roberts in his discussion. First, the contractor who buys the equipment can be badly hurt, as the current equipment being built for the armed forces has many substitute alloy metals in it, specified by the government and necessary to conserve the better alloys for fighting equipment. The machines made of these substitute metals necessarily will not last as long as the machines which will be manufactured six months or so after the government has released the better basic metals for their construction. Thus the contractor who buys the surplus machines may find himself lagging in production a year or two after the manufacture of new equipment begins, when his competitors are buying the post-war product.

Mr. Roberts recommends the disposition of surplus equipment through regularly established channels, because the purchaser will have to go to the equipment distributor anyway for the balance of parts needed for the continued operation of the machines. In concluding, Mr.

(Continued on next page)

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For more than twenty years, the scientifically designed Davenport-Frink Sno-Plows have been steadily improved as the result of careful action studies in the field—under all snow and ice conditions. That's why these brilliant performers insure FASTER—SAFER—CLEANER SNOW REMOVAL. Write us for complete information.

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TRANSLODE Expansion and Contraction Joints have been giving excellent load transfer performance on thousands of miles of American pavements since 1932. Today's improved and simplified design retains the continuous base which makes installation easier and seals the joint against the infiltration of dirt from the soft subgrade. The weight of the joint has been reduced while the rigidity has been increased to make handling and finishing easier.

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ARBA Meeting

(Continued from preceding page)

Roberts warned contractors not to overload their equipment roster with the first machines off the production line but to buy only those which they need most urgently, and then gradually buy into the newer and better post-war equipment production.

Airport Session

In recognition of the inevitable vast airport construction program which will result from the recent CAA report recommending a total of 6,000 airports within the next decade, the ARBA devoted its Thursday morning session, January 18, to discussions of airport engineering and construction. Congressman Jennings Randolph of West Virginia, whose interest in aviation legislation is well known, presided during the presentation of the six papers.

After short introductory remarks by Congressman Randolph in his enthusiastic and forceful manner, Lowell H. Swenson, Manager, National Aeronautic Association, spoke on "A New Market for the Construction Industry", outlining the work of his association and indicating the extent of the aeronautic construction program in the immediate future, saying, "At present there are only 286 communities in all of the United States served by air transport companies. Yet there are more than 6,000 communities in this country with populations of 1,000 persons or more. That covers only the commercial air-transport phase of the problem. Private flying needs attention too. Currently there are fewer than 25,000 non-military airplanes. Most of them are of the personal-owner type. In most of the nation there is one landing facility for only every 1,230 square miles.

"If that 25,000-plane figure remained static, nobody would worry about it. But it isn't going to remain static. Government and industry estimate that, when the war is over, no less than 6,000,000 persons are going to be interested in aviation. At a conservative mark-down, 1,500,000 are going to be interested in private flying. But they *aren't* going to be interested in private flying unless landing facilities are made available to them.

"That's where the National Airport Program comes in. It is proposed to spend in excess of $2,000,000,000, shared equally between the Federal treasury and the treasuries of the nation's political subdivisions, on landing areas. This construction work would be done in a period of five to ten years after the war ends. That $2,000,000,000, by the way, does not cover estimates on the cost of the land or of buildings. The sum total will be around $2,250,000,000.

"We have something less than 3,000 landing areas now. It is proposed to improve about 1,600 existing landing fields and build 3,050 new ones. Of the new ones, interestingly enough, 2,900 will be of a size and nature especially suitable to personal flying. Of the proposed Federal money to be spent, more than three-fourths of it, $777,000,000, tentatively is earmarked for communities of 25,000 population and less."

A short paper "Airports and Industry" by Leslie L. Schroeder, Commissioner of Aeronautics of Minnesota, was read for him in his absence, followed by a factual address on "The National Airport Program" by Charles B. Donaldson, Director of Airports, Civil Aeronautic Administration. He opened with the comment, "Many of you in past years have participated in airport construction, most of which was a by-product of the pump-priming and work-relief programs and later defense program. We have now reached a point, however, when civil aviation is important enough in the national economy to have its need for public airport facilities considered on its own merit. In the years just ahead, aviation inevitably must assume a position beside the rail, water, and road systems as an accepted and major form of transportation."

Continuing to discuss the need for airports, Mr. Donaldson noted, "By investing $25,000,000,000 in roads during the last 25 years, we have made it possible for the United States to become a nation on wheels, with 32,000,000 motor vehicles in operation during normal times. As a by-product of the war, we have the necessary aircraft manufacturing facilities and a huge pool of potential pilots to make this a nation on wings, with all that implies in war and peace. There will be at the end of the war approximately 350,000 Army and Navy pilots and 150,000 civilian pilots and students. Also interested in flying will be 2,500,000 men trained by the armed forces in other aviation skills and an almost equal number employed in our aviation factories. Add to these 250,000 students who are taking aviation courses in the high schools each year and there is a total of 6,000,000 prospective fliers.

"Without overlooking the importance of air transport, the sale of personal air-

(Concluded on next page)

"Sir, remember saying how nice it would be to have fresh bread on convoy?"

PILE HAMMERS
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Special Equipment
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Write for descriptive catalogs

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You need have no doubts about your mixer or paver delivering its full rated capacity if it carries an AGC rating plate. That plate is your guarantee of capacity and performance right down to the last yard.

When you estimate a job, you know exactly what your mixer and paver capacities are. You eliminate the guesswork that can be so important on "close jobs."

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ARBA Meeting

(*Continued from preceding page*)

craft offers the brightest hope for a mass market which will maintain even a reasonable fraction of our present $20,000,000,000 a year aircraft manufacturing industry.

"Preserving a nucleus of the present aircraft manufacturing industry is important both to defense and the national economy, for it can provide a substantial source of employment in peace, and the weapons of war should we ever need them in a hurry.

"To provide facilities adequate to the requirements of places now designated as air carrier stops, it will be necessary to improve 174 airports which are deficient, in terms of transport craft now in use, in number and length of runways, clearness of approaches, taxiways, parking and servicing aprons, or other features.

"As for the 678 locations named in applications for Certificates of Convenience and Necessity pending before the Civil Aeronautics Board, only 93 have suitable airports. Improvement projects would be required at 385, (257 have no paved runways), and new fields would have to be constructed at 200. Communities of 25,000 population and less show the greatest lack of airport facilities. There are deficiencies to a lesser extent in most of the larger cities.

"Among the 286 places (101 temporarily suspended, most of them because planes are not available to the air lines) now approved for air carrier service, there are 140 which do not meet the desirable minimum of 5,000-foot paved runways. In addition, many have inadequate taxiways, parking and servicing aprons, an insufficient number of runways for the normal variation of winds, and obstructed approaches. Where proper taxiways are not provided, the runways must serve a dual purpose, with a serious loss in traffic capacity.

"Our studies have indicated that the United States will require a total of approximately 6,300 civil airports of all classes and sizes to serve adequately the transport and private flying which can be reasonably expected in five to ten years after the war and to foster its growth.

"The estimated cost of the development of such a system of airports exclusive of land and buildings is approximately $1,000,000,000 which can be roughly broken down into three categories. First is the preparation of the site, which includes clearing, grubbing, grading, and surface conditioning. This item alone would require $525,000,000 or 52 per cent of the total cost. The next item is paving, which includes runway, taxiway and apron paving estimated to cost approximately $400,000,000 or 40 per cent of the total. The third item is the lighting, radio, and miscellaneous work which is estimated at approximately $75,000,000 or 8 per cent of the cost.

"A national airport system is so essential that its development cannot be laid away on a shelf of public works plans for use only in a period of widespread unemployment. However, airport development as part of any public works program meets all of the fundamental requirements of public works, since it would provide continuing employment opportunities, it would produce facilities which would be of immense value to the national defense, it would provide useful improvements of permanent value to the community, it would encourage further investment by private interests, it would protect the general health and safety, and it would contribute to the general welfare of the country."

The concluding portion of the morning program was devoted to three papers on airport design, construction and maintenance, presented by Harold J. McKeever, Editor, *Roads and Streets*, Theodore Reed Kendall, Editor, CONTRACTORS AND ENGINEERS MONTHLY, and H. W. Hunt, Associate Editor, *Engineering News-Record*.

The luncheon meeting was addressed by Major General Eugene Reybold, Chief of Engineers, following which the delegates gathered in special sessions of the Manufacturers' Committee on the Disposal of Surplus Property and the business meetings of the Highway Contractors' Division and the County Highway Officials' Division. These were followed by the annual business meeting of the Association, at which sixteen resolutions were presented and adopted.

These included a resolution commending the roads committees of the House and Senate for their work in the preparation and passage of S2105, providing $1,500,000,000 of Federal-Aid for highway construction in the first three post-war years; one urging early passage of legislation by the Congress to "set in motion a nation-wide airport construction program to embrace Federal, state and municipal governments"; resolutions restating the endorsement by the ARBA of contract construction, and of action by state legislatures setting in motion state constitutional amendments prohibiting diversion of state gas-tax money; an appeal from the County Highway Officials' Division for action by state highway departments and the Public Roads Administration in formulating plans and rules for the distribution of secondary-road work under the new Federal-Aid bill; one on the disposal of surplus war equipment; and one commending the Construction Equipment Advertisers for the series of striking integrated panels displayed in the interest of highway safety, improved transportation and greater employment through highway construction.

Manufacturers' Day

The 42nd Annual Meeting closed with Friday, January 19, given over to three sessions of the Manufacturers' Division. The morning session was largely devoted to the Inter-American Training Program in which the American Road Builders' Association is cooperating with the International Training Administration and the Office of Coordinator of Inter-American Affairs.

At the luncheon meeting, L. C. Schraub, Vice President and General Manager, Union Wire Rope Co., described the manner in which his company, like others, has promoted the ARBA Post-War Highway Program in its national advertising. Reports show that this cooperative effort has been very effective in broadening the distribution of the various ARBA booklets on the plan.

The afternoon meeting, presided over by W. B. Greene, Vice President, Barber-Greene Co., was devoted to a discussion of the disposal of surplus war equipment by Ed. Phillips, Director, Construction Machinery and Farm Equipment Section, Surplus Property Division, Treasury Department, and to a report by the Construction Machinery Manufacturers' War Surplus Committee.

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RAZOR-BACK SHOVEL

To its famous "backbone" construction, RAZOR-BACK now adds a new advantage. The steel is "*Surface Peened*"—stands constant bending 2½ to 5 times longer than usual fine shovel steel—makes RAZOR-BACK, the strongest of light shovels, even tougher and longer lived. *Send for Catalog and prices.*

THE UNION FORK & HOE COMPANY
683 Hocking Street Columbus 15, Ohio

Standard tests of the American Society for Testing Materials show how RAZOR-BACK "Surface peened" steel ("A") withstands continuous 2-way bending longer than fine heat-treated steel—

2½ times longer at extreme of 90,000 lbs. per sq. in.
5 times longer at 80,000 lbs.
Unlimited at 70,000 lbs.

Power shovels and other construction equipment are normally built with a lot of "beef" so they can take the shocks which have long been accepted as part of the day's work. But if you stop to think about it, there's another—and better—answer. Eliminate the shocks and you can eliminate the cost and weight of the extra "beef" . . . and thereby make "gravy" for the man who pays for fuel and upkeep.

When the power train includes a Twin Disc Hydraulic Coupling, there's a cushion of fluid which takes the blows that would otherwise wrack the equipment from end to end. Cables, gears, booms, and buckets—all last longer because the excess strain of a shock load never touches them. *Operators* last longer, too; it's a lot more comfortable to operate a coupling-equipped job.

Look into the potential savings made possible by a Twin Disc Hydraulic Coupling. Send for a free copy of Bulletin 136 to get the interesting details. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

26TH ANNUAL MEETING
ASSOCIATED EQUIPMENT DISTRIBUTORS
EDGEWATER BEACH HOTEL - CHICAGO - JANUARY 22 - 24, 1945
PHOTOGRAPH BY CONTRACTORS AND ENGINEERS MONTHLY
EDGAR J. BUTTENHEIM - PUBLISHER

New AED Officers

At the 26th Annual Meeting of the Associated Equipment Distributors, held January 22-25 at the Edgewater Beach Hotel in Chicago, H. O. Penn, President, H. O. Penn Machinery Co., New York City, was elected President for the coming year. F. B. McBath, Columbia Equipment Co., Portland, Ore., was elected Executive Vice President, and the two other Vice Presidents are Hal M. Davis, R. B. Everett & Co., Houston, Texas, and George N. Beckwith, Beckwith Machinery Co., Pittsburgh, Pa. W. W. Bucher, R. E. Brooks Co., New York City, was reelected Treasurer, and Carol W. Winchester renamed Executive Secretary.

The directors for 1945 include: John Gorman, Tractors, Inc., Providence, R. I.; H. O. Penn; Boyd Dale, Dale & Rankin, Newark, N. J.; George N. Beckwith; L. C. Basham, West Virginia Tractor Co., Charleston, W. Va.; A. E. Hahman, Tractor & Machinery Co., Atlanta, Ga.; William T. Walsh, Walsh Equipment Co., Cleveland, Ohio; R. G. Moeller, R. G. Moeller Co., Detroit, Mich.; C. F. Halladay, Western Materials Co., Sioux Falls, S. D.; T. N. Webster, Webster-Hedgecock Tractor Co., St. Louis, Mo.; Hal M. Davis; A. F. Garlinghouse, Garlinghouse Bros., Los Angeles, Calif.; F. B. McBath; E. F. Higginbotham, Road Builders Equipment Co., Memphis, Tenn.; D. W. Rakestraw, Contractors Equipment & Supply Co., Albuquerque, N. M.; and T. F. Just, Just Equipment & Supply Co., Montreal, Canada.

Canadian Dealer Acquires FWD and Cummins Sales Cos.

A recently formed distributor company, Brooks Equipment Ltd., located at 306 Notre Dame Ave., Winnipeg, Canada, unites in one firm the companies formerly known as FWD Motor Trucks Western Ltd. and Cummins Diesel Sales Service. The two principal lines to be handled by the new company are FWD trucks, manufactured by the Four Wheel Drive Auto Co. of Clintonville, Wis., for which it holds the franchise in western Canada, and Cummins diesel engines, product of the Cummins Engine Co. Inc., of Columbus, Ind., for which it has the franchise in Manitoba and Saskatchewan. Auxiliary equipment for trucks and engines will also be handled.

The new organization is headed by Nelson T. Brooks as President and General Manager, and will continue with the staff and management of the two earlier service companies.

Naphthenate Coating For Wood, Burlap or Rope

A line of copper naphthenate preservatives to protect against the destructive effects of rot, decay, mildew, and insects is described in a bulletin just received. Designed to give long-term protection at low cost, this Triple-A coating is said to penetrate and impregnate wood without leaching; it is also applicable to heavy fabrics such as cotton duck, burlap, canvas, and rope. Methods of application are described in the bulletin, which states that Triple-A requires no heating, is non-poisonous to humans, and does not increase fire risk. Four formulae are available in 1, 5, 30, and 55-gallon containers, and special solutions may also be obtained.

For copies of this Bulletin 381, write to the Quigley Co., Inc., 527 Fifth Ave., New York 17, N. Y.

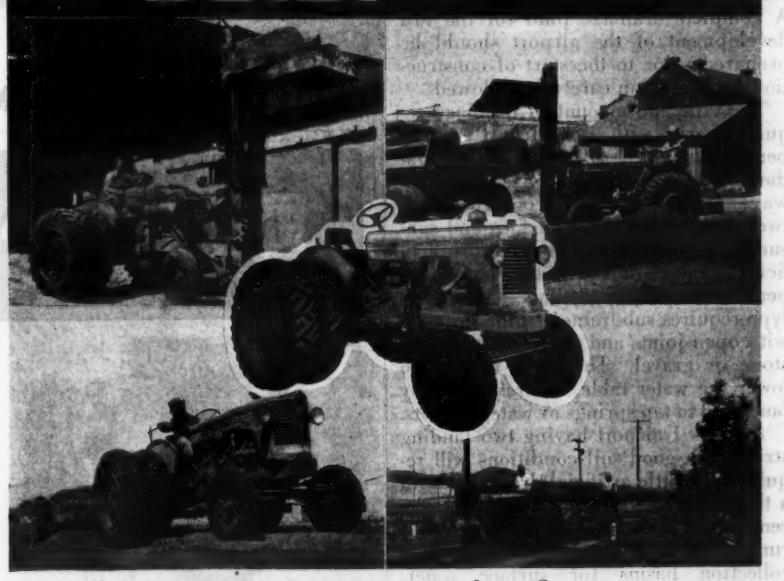
MALL Tools illustrated above are Model 80 Circular Electric Saw 8" blade 2½" cutting capacity, also 12" blade and 4½" capacity. 1½ H.P. Gasoline-Powered Concrete Vibrator also available with 3 H.P. round base or wheel-barrow mounting as well as 1½ H.P. Universal Electric and Pneumatic models. Pneumatic Chain Saw, also Gasoline Engine models, can be furnished in many cutting capacities.

Write direct for literature and prices.

MALL TOOL COMPANY • 7743 South Chicago Ave., Chicago 19, Ill.

Mall PORTABLE POWER TOOLS

"BUILT" to do the JOB



It's PERFORMANCE that Counts . . .

"Know-How" are small words but they have a *big meaning* in the manufacture of *industrial tractors.* "Know-How" and "Built to do the Job" are synonymous in building *MM Industrial Tractors.* The dependability, durability and low operating cost of MM Industrial Tractors is widely known. MM Industrial Tractors are built not only to pull graders, scrapers, packers and tampers but are also versatile enough to be adapted to loaders, cranes, snowplows and bulldozers. The short turning radius, good traction, high road speed, heavy-duty engines, special heavy-duty front axles, steering gears and counter weights make them ideal to "fit in" on the hundreds of jobs in any road or highway program. MM Industrial Tractors have a power range of from 27 to 64 brake HP on 70 octane gasoline and are built for *real power without sacrificing* operating economy and long life performance.

MODEL	ENGINE	BRAKE HP ON 70 OCTANE GASOLINE	FORWARD SPEEDS	MILES PER HOUR
RTI	3⅛ x 4-4 cyl.	27	4	2 to 11
UTI	4¼ x 5-4 cyl.	48	5	2.2 to 18
GTA-I	4⅛ x 6-4 cyl.	64	4	2.5 to 10

MINNEAPOLIS-MOLINE POWER IMPLEMENT COMPANY
MINNEAPOLIS 1, MINNESOTA, U. S. A.

The Major Factors In Airport Building

(*Continued from page 36*)

ing strips is 1 per cent. This will insure the rapid collection of rainwater and, at the same time, is not steep enough to cause serious erosion.

Next in importance is the site clearance to permit a view of the entire landing strip or runway. On Class 1 airports each strip should be so graded as to permit a clear sight from any point 6 feet above the surface to any other point 6 feet above the landing strip. This sight line may be increased to 10 feet for a Class 4 airport.

All fill areas should be built up in 6-inch layers and compacted in accordance with standard practice. In general, sheepsfoot tamping rollers should be used, and if the fill material is dry, the addition of a suitable amount of water may be necessary during the rolling operation to insure complete compaction.

At least 6 inches of the subgrade under pavement areas should be constructed of granular material to insure uniformly high subgrade support. If this material cannot be obtained from the excavation areas, it should be borrowed from other areas on or off the site.

The side slopes of landing strips should be constructed as flat as possible. A 5 to 1 slope is recommended. In cut areas, the backslope should be such as to provide a 7 to 1 clearance ratio from the edge of the landing strip. Since approximately 15 feet is required beyond the edge of the strip for a ditch or possibly a roadway, a 5 to 1 ratio is usually sufficient. All fill slopes should be protected against surface-water erosion by the construction of a berm and gutter along the sides of the landing strip.

Drainage

Past experience has shown that more failures of runway paving result from unstable soil conditions caused by a lack of proper drainage than for any other reason. The construction of the drainage system should be carried on at the same time as the grading operation. A complete drainage plan for the full development of the airport should be prepared prior to the start of construction and this plan carefully followed.

The type and amount of drainage required varies with each airport and depends on the type of soil structure and the arrangement of runways and taxiways. In general we are concerned with two types of drainage: surface and subsurface. The first may not require artificial removal of the water, but is dependent on proper grading. The second type requires subdrains of pipe installed with open joints and encased in crushed stone or gravel. This type is used to lower the water table, to drain swampy land, and to tap springs or water pockets.

A Class 1 airport having two landing strips with good soil conditions will require very little artificial drainage; with a three or four landing-strip layout, the central areas between the intersection of runways should be graded to serve as collection basins for surface water. Series of catch basins with grate inlets and pipe are required for the rapid removal of this water.

As indicated previously, berms and gutters for the collection of surface water should be constructed along the edges of all landing strips in fill sections to prevent the water from flowing over the edges and eroding the banks. Collecting basins with relief drains should be constructed at intervals of 300 or 400 feet along this gutter. Approximately 15 feet beyond the normal edge of the landing strip is required for this construction. Erosion of the berm around the inlet is prevented by the construction of a head wall and apron of either concrete or stone masonry. The water is carried under the berm and down the slope in a concrete or metal pipe, or a spillway. Spillways may be constructed of concrete or stone masonry.

Surfacing

The final operation for completion of the airport is the construction of the wearing surface for the runways. It is not usual to provide paved runways for Class 1 airports, as pilots prefer to operate the smaller planes from sodded fields. The grassing of an airport is very important because the cost of maintenance is directly related to the quality and quantity of turfing. The better the stand of grass, the lower the cost of maintenance, especially from erosion and washes.

There are four types of surfaced airports:

1. Paved-runway airports: these are usually Class 3 and Class 4, designed for intensive traffic and heavy loading.
2. All-way turfed airports: this type

(*Concluded on next page*)

Geerpres—

The ESSENTIAL MOP WRINGER

100% of the output of Geerpres wringers is now going directly to the Armed Services—to help save lives by making it easier to keep Army Hospitals clean both here and at the fighting fronts.

No higher tribute could be paid any mop wringer than this. Tomorrow, those wringers—with a new kind of SERVICE RECORD will again be available for industrial and commercial use.

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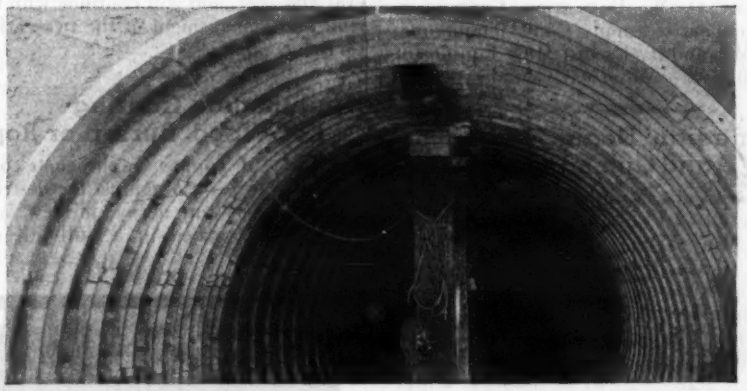
THESE STURDY PLATES Speed Tunneling

Lining this tunnel with strong, easy-to-handle ARMCO Plates was much faster than timbering.



Fast tunneling is no trick with ARMCO Liner Plates. Inexperienced crews can install them quickly. One man easily handles the strong, light-weight steel sections, bolting them together with regular wrenches. Work moves fast and costs are low.

KEEP COSTS DOWN

On a strength-weight basis, ARMCO Plates cost less than four-flange types. In many cases you actually buy fewer plates because their great strength permits use of alternate rings in partly self-supporting ground. You'll save even more by ordering ARMCO Plates to fit the individual job. There's a type and gage to meet every condition. Excess weight is out.

WIDELY ACCEPTED

Use ARMCO Liner plates on your next tunnel. Other contractors and engineers find them a big help in "holing through" ahead of schedule and under the estimate. ARMCO Drainage Products Association, 35 Curtis Street, Middletown, Ohio.

ARMCO TUNNEL LINER PLATES

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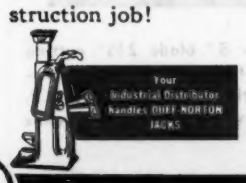
husky helpers for every JOB { LIFTING, LOWERING, PUSHING, PULLING

You get maximum efficiency with Duff-Norton Jacks on the job helping with the heavy lifting and moving. These husky Jacks are built to take the roughest, toughest kind of service, yet they're easy to spot and operate. Count on Duff-Norton Jacks for safety and dependability on every construction job!



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There's a Duff-Norton Jack for every job—and Catalog 202 gives you full details on every model and size. Write now for your copy.

DUFF-NORTON Jacks are "Mechanical Muscles" for every job of lifting or moving.

THE DUFF-NORTON MANUFACTURING CO.
PITTSBURGH, PENNSYLVANIA
Canadian Plant: Coaticook, Que. Representatives in Principal Cities

The Major Factors In Airport Building

(*Continued from preceding page*)

provides a usable landing area in all directions.

3. Landing-strip turfed airports: this is the same as the all-way landing field except that traffic is limited to one or more directions.

4. Turf-surfaced-runway airports: this type of airport is low in cost, being built up on a stabilized subgrade and has a well-developed turf which will withstand moderate weight under all weather conditions. This type is preferable and should be considered in the construction of Class 1 airports.

There are three areas on an airport, which are classed as follows:

1. Intensive traffic areas: on large airports, these areas should be paved. If the areas are to be turfed, the turf should be dense, low-growing, and tough, to withstand traffic. The areas requiring this treatment are runways, taxiways, and aprons.

2. Occasional traffic areas lying between runways, taxiways, and aprons can be developed over a longer period of time and do not require so thick a turf as the runways.

3. Non-traffic areas located around hangars and the administration building may be planted with lawn-type grass and be landscaped.

Conclusion

After the war between the states, the use of the steam engine for transportation resulted in the construction of thousands of miles of railroads. That was the railroad age. After the close of World War I, the use of the automobile was the cause of the construction of our vast network of paved highways.

So today we are on the eve of the "air age". The use of the airplane for rapid transportation after the close of this war will require the construction of hundreds of airports. Therefore it is the duty of engineers and contractors to work, plan and prepare for this flying age.

From a paper presented at the Southeastern Airport Management Conference at the Alabama Polytechnic Institute, Auburn, Ala., August, 1944.

Blaw-Knox Co. Appoints Export Dept. Engineer

Paul J. Wolfert, formerly assistant to the manager of construction equipment of the Blaw-Knox Division of the Blaw-Knox Co. Pittsburgh, Pa., has been promoted to Export Department Engineer and will be located in New York, assisting H. T. Schwier, Export Manager. Mr. Wolfert has been a member of the staff since 1939, and previous to that time had been employed by a number of firms as construction equipment engineer. Last year on request he served the U. S. Army Corps of Engineers as an expert consultant and spent some time in the European Theatre of Operations.

New Asst. Sales Mgr. For Wickwire Spencer

H. C. Allington has been made Assistant General Sales Manager of the Wickwire Spencer Co., New York City, and its subsidiary, the American Wire Fabrics Corp., where he will continue his work on market development and expansion. Mr. Allington joined the Wickwire staff in February, 1944.

No Tipping

The Insley Excavator's unusual hook roller construction offers two outstanding advantages. Three hook rollers are provided to secure the revolving frame to the lower frame. Their location, one in front and two in the rear, prevents the revolving frame from tipping . . . assures proper balance on rough ground and under heavy load. This hook roller construction also extends the life of equipment because it relieves the center pin of all vertical stress . . . requires it to take *only* the horizontal shear load.

As in this one particular instance, you'll find that every detail of Insley's design and construction makes an important contribution to dependable, low-cost performance on the toughest jobs—dirt, rock or what have you! That's why it will pay you to get all the facts on ⅜ and ½-yd. Insley Type K Excavators.

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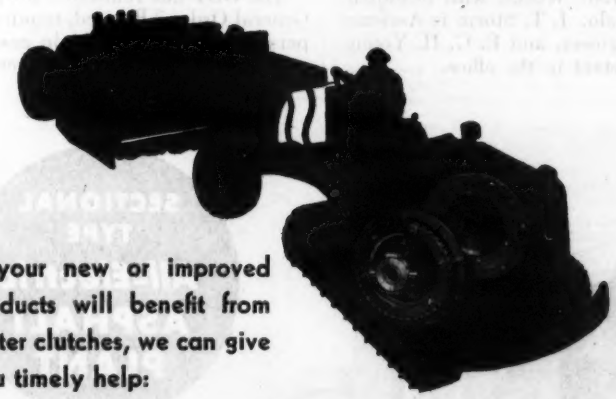

If your new or improved products will benefit from better clutches, we can give you timely help:

As clutch building specialists, with over a quarter century of experience, we study your product designs and recommend the BEST clutches for your particular needs. We then have the facilities to produce those clutches on a basis that will strengthen the competitive position of your products — as to power, control, size, weight, service and price. BRING YOUR CLUTCH PROBLEMS TO US — By sending your specifications to us NOW, your clutch needs can be met without unnecessary delay — when reconversion starts.

SEND FOR THIS HANDY BULLETIN ON POWER TRANSMISSION

It shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications. Every production engineer will find help in this handy bulletin, when planning postwar products.

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ROCKFORD CLUTCHES

☆ Buy A Share In America ☆

Lend a HELPING HAND with your WAR BONDS

N. Y. Protects Roads With New Surfacing

(*Continued from page 68*)

eral Maintenance Foreman Charles Yocum.

The Hot-Mix

The proportions of aggregate and asphalt in the steam-dispersion asphaltic-concrete mix are given in the accompanying table.

The weight of the workability compound is about 2 pounds per quart. Where it is shown as 0.2 per cent of the mix, it is one quart per 1,000 pounds of mix, and as 0.15 per cent it is ¾ quart per 1,000 pounds of mix.

Resurfacing Brick

A half-mile section of old brick pavement in the village of Williamsville on N. Y. 5 in Erie County was also recently resurfaced with Bituminous Macadam Mixing Method, Type 3. This old pavement was originally laid in 1911 and later widened with concrete. The bricks had long since become rough and out of shape, particularly around the single-track trolley line in the center of the street. The tracks were removed, and broken stone placed in the two troughs and consolidated by rolling. The voids were filled with a 1:2 cement grout. Two layers of bituminous macadam were then laid.

Personnel

Charles R. Waters is District Engineer of District 5, New York State Department of Public Works, with headquarters in Buffalo. I. T. Storm is Assistant District Engineer, and E. G. H. Youngmann, Assistant in the office.

Proportions in Steam-Dispersion Asphaltic Concrete Used in New York

Aggregate and Materials	Passing	Retained On	Percentages Fine Mix	Percentages Coarse Mix
Broken stone, No. 2	1-inch	½-inch	0	55
Broken stone, No. 1	½ inch	¼-inch	20	27
Screenings and/or sand, No. 1-A	¼-inch	⅛-inch	35	5
Screenings and/or sand, No. 1-B	⅛-inch	No. 80 screen	35	8.85
Screenings and/or sand	No. 80 screen		4	0
Workability compound			0.2	0.15
Asphalt			5.8	4.0
			100.0	100.0

Caterpillar Appoints New Parts Depots Head

Merwin T. Farley has been advanced to the post of Supervisor of Parts Depots of the Caterpillar Tractor Co., Peoria, Ill., and will devote his entire time to the supervision and future development of these depots which at present are maintained in Kansas City, Kan., Memphis, Tenn., Rensselaer, N. Y., San Leandro, Calif., and Spokane, Wash. Mr. Farley has been associated with Caterpillar and its predecessor companies since 1914, and since 1942 has assisted the Purchasing Department in material procurement.

Tank-Car Shortage

The Office of Defense Transportation has called upon government departments, railway officials and industry heads to take steps to meet the critical situation resulting from "major changes in the petroleum situation due to the withdrawal of tankers and greatly increased military demands for petroleum and industry products". This has caused the nation's most acute shortage of tank cars.

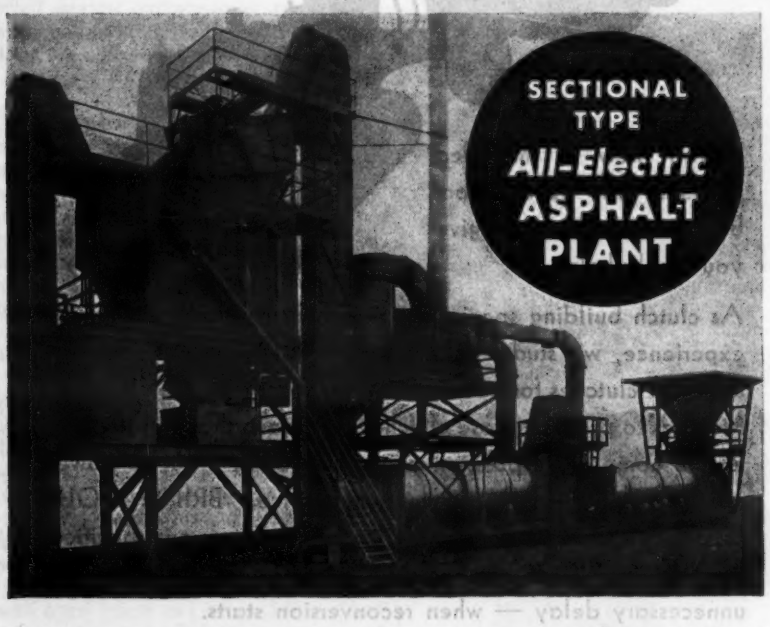
The ODT has reinstated provision of General Order 7 Revised, requiring shippers and carriers to obtain government permits for the movement of crude and petroleum products in tank cars for distances 200 miles or less. ODT Director Johnson wrote oil company officials that applications for such permits "will be screened more carefully than ever before".

Lima Delivers 500th Unit in 1944 to Army

The employees of the Shovel and Crane Division, Lima Locomotive Works, Lima, Ohio, dropped their tools long enough on December 22 to participate in a ceremony at which the 500th Lima ¾-yard crane - shovel - dragline made for the Army Engineers during 1944 was delivered to a representative of the Engineer Corps. This 500th unit was christened "Axis Grave Digger".

The 500th Lima ¾-yard Paymaster to be built by Lima Locomotive Works, Inc., Shovel and Crane Division for the U. S. Engineer Corps during 1944.

These 500 ¾-yard excavators produced for the U. S. Engineer Corps during 1944 were in addition to many other shovels and cranes of various capacities built for the Engineers during the same period.



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This sectional type H & B asphalt plant is completely electrical in operation, with all units driven by individual motors—no chains or countershafts. All units are wired completely at our factory. Once the plant is assembled you are ready to hook up to the power line and start operating. The plant is quickly assembled and disassembled, and easily portable. Refinements in design include a larger fan, new horizontal cyclone dust collector and new type screen, making for greater compactness and increased efficiency. Write for complete information.

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Materials stored in the open are protected from weather when covered with SISALKRAFT.

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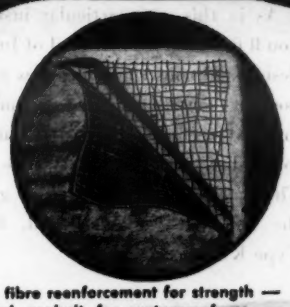

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Bituminous Paving In Lake County, Ill.

(*Continued from page 75*)

of $23,247, by the Arrow Petroleum Co., Forest Park, Ill., which also did the plant mixing of the bituminous surface of dense-graded aggregate. This company applied the asphalt prime and delivered the plant-mix to the bituminous spreader. Thirty-five men were employed by the county in the road crew and at the gravel crusher. The county supplied the contractor with the gravel for the C-6 mix.

Earlier Construction

Before the Lake County Highway Department decided to build gravel-base roads surfaced with sub-class C-6 plant-mix, which term is also a specification item of the Illinois Division of Highways, bituminous highway construction in other counties and states was investigated. On the basis of this survey to discover a durable surface which could be laid at low cost, using the gravel deposits available in the county, the choice of pavements was reduced to two types, C-4 and C-6. C-4 pavement is coarse-aggregate crushed-gravel construction using large-size stone, 2½-inch, which is keyed with smaller stone. This contrasts with the densely graded aggregate used in the C-6 surface. A 4-mile section of each type of road was built in 1938, and on the merits of the finished construction C-6 was chosen for future county highways.

Besides bituminous and gravel pavements the county has built 155 miles of concrete and brick highways known as State-Aid roads. The county's basic State-Aid mileage is 212.5. This figure is 25 per cent of the total public road mileage in the county, excluding streets, and this percentage represents the basic permissible mileage of State-Aid roads in second-class counties in Illinois. When a county has improved at least 80 per cent of its State-Aid roads, this mileage can be increased by 10 per cent.

According to the Illinois State-Aid law, which encourages counties to construct higher types of paved surfaces, the State will assume the maintenance burden on any of the following three types of county-built roads: (1) portland-cement concrete; (2) brick on a portland-cement concrete base; (3) bituminous concrete on a portland-cement concrete base. Other types of roads are the maintenance responsibility of the county which builds them.

Start of Road Program

The highway building program in Lake County really started in 1913 when the State Road and Bridge Law authorized the issuance of bonds for highway construction. Four successive bond issues were ratified by the County which enabled the Highway Department to construct a satisfactory basic network of roads. The first two of these bond issues for $500,000 and $1,000,000 respectively have since been retired. The third issue of $730,000 will be completely amortized in 1946, while the fourth bond issue of $1,250,000 will be retired in 1949. Part of the annual allotment to the county of state motor-fuel tax money, which in 1944 was around $170,000, is used to retire the bonds. As about $160,000 is required annually for the amortization fund, little of this tax money has been available for road building. Beginning in 1946, however, when one of the outstanding bond issues will be retired, $40,000 more will be annually available for road work, and in 1949, with the end of bonded indebtedness, the entire allotment of gas-tax money, with the exception of that needed for maintenance, will be available for State-Aid road-system improvements.

The major part of the highway program was completed between 1913 and 1930 during which time 155 miles of concrete road was built by the county. By using this type of pavement, the county was relieved of all maintenance costs which were assumed by the State. Attention was then given to the secondary-road system by keying the type of construction to the volume and kind of traffic the roads would be called upon to bear. County residents, around 125,000 in number, at first accepted reluctantly the change in type of pavement from concrete to bituminous, even though construction costs were lower. The smooth, resilient, and dustless riding qualities of the new bituminous C-6 surface finally won public approval.

R. M. Lobdell is Superintendent of Highways of Lake County, Ill., with headquarters at Waukegan, the county seat.

Para-Plastic

Hot poured "MIRACLE SEAL"

Manufactured by SERVICISED to conform to Federal Spec. SS-F-336 and C.A.A. Spec. P-605, *Para-Plastic* is recognized in the construction engineering field as a positive water seal for concrete and general construction.

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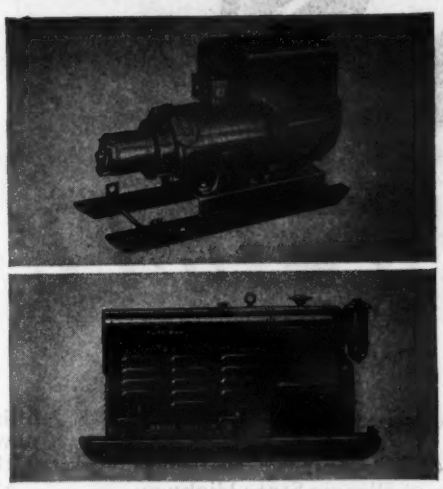

Eleven basic sizes from 500 watts to 17,000 watts and 30 different types to meet all AC or DC power or lighting requirements. Housed or open models . . . available with wheelbarrow, buggy or trailer mounting. For operating a single tool or motor, or floodlight . . . or gangs of tools, groups of motors, or lighting entire areas. Easy to put in operation . . . economical to operate and maintain. Compact, portable, self-contained.

For complete details write for Bulletin 594.

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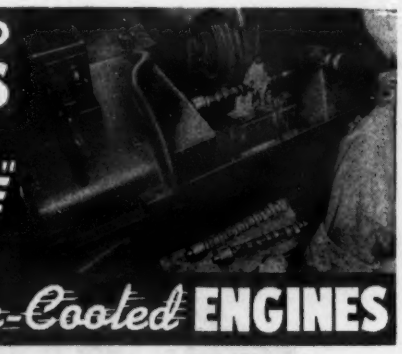
COMPACT PORTABLE

SAVE TIME AND SPEED WORK WHEREVER POWER OR LIGHTING IS REQUIRED

MASTER VIBRATOR COMPANY
Dayton 1, Ohio • Distributors throughout United States and Canada
Products Include: Concrete Vibrators, Gas or Electric Surfacing Attachments, High Speed Tools • Vibratory Concrete Finishing Screeds • Rotary Concrete Floor Finishing Machines • Portable Gas Electric Generator Plants, 500 Watt to 17000 Watt, Voltage Regulators and Portable Mountings Optional • Master Flood and Shovel Lights • Electric or Gas Engine Driven Power Plow Hammers

PRECISION-GROUND CAMSHAFTS Another "HIDDEN VALUE" IN ALL WISCONSIN Air-Cooled ENGINES



The "Camomatic" is another of those more-than-human machines that help to put heavy-duty serviceability and smooth-running efficiency into every Wisconsin Engine.

This machine automatically rough-grinds (and subsequently "smooth-finishes") each and every cam for every Wisconsin Air-Cooled Engine. The grinding wheel finishes cam contour with absolute precision and uniformity. Every camshaft for a given size engine, is exactly like all the other camshafts for all the other engines of that size.

This is another of those features you *don't* "see" . . . but it performs an important service for you *on the job, on your equipment.*

Most H.P. per pound

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MILWAUKEE 14, WISCONSIN U. S. A.
World's Largest Builders of Heavy-Duty Air-Cooled Engines

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Contractors and Engineers Monthly

ILLINOIS SAVES MONEY

IN MODERNIZING DRAINAGE ON 28 MILES OF HIGHWAY 52

.. WITH TOURNAPULLS

15 heaped yards were easily loaded on shallow shoulder cuts. Note accurate grading.

Tournapulls hauled over pavement to the nearest farm where dirt was needed . . . no damage to pavement, no delay to highway traffic.

Farmers were happy to get low spots, mud holes, and erosion washes filled. Tournapulls' thin accurate spreads left a clean, well finished job.

DIXON Construction Company of Albany, Wisconsin was awarded the job of modernizing the drainage on 28 miles of Illinois State Highway 52 from Salina west to Highway 66.

The work consisted of regrading the drainage ditches and improving the shoulders throughout. Light cuts, long hauls, and on-pavement travel without interrupting traffic were involved. Surplus dirt was used to assist farmers in the area by correcting erosion in fields, filling mud holes, and removing unsanitary conditions around barns and other buildings.

Equipment for the job included two Super C Tournapulls working with a snatch tractor and an auto patrol.

Tournapull performance proved particularly effective because of their high speed hauling, fast loading in the light cuts, controlled spread for the farmyard filling, and their ability to haul on the pavement without slab damage and without interrupting traffic.

Much postwar dirtmoving is going to give you special problems similar to the Dixon job. Plan now to equip with Tournapulls because they best fit profit-making requirements of both special and average jobs.

See your LeTourneau distributor and ask him to show you why Tournapulls can move dirt at lower costs than any other type of equipment!

Super C Tournapull Specifications

Capacity:	
Struck	12.1 cubic yards
Heaped	15 cubic yards
Speed (high)	14.9 mph
Power	150 HP Diesel
Wheelbase	22 feet 0 inches
Width of cut	8½ feet
Tire Size	21.00 x 25
Weight (empty)	31,000 pounds
Weight per horsepower	207 pounds
Tractive weight (loaded) on power wheels	30,300 pounds

Interchangeable units: Tournacrane, rear-dump Tournatrailer and flat-bed Tournatruck.

Output per 60-minute hour in common, 1000-foot one-way, level haul, snatch loading, 156 pay yards per Super C.

RUBBER-TIRED POWER FOR FASTER EARTHMOVING

LETOURNEAU TOURNAPULLS

JOB-PROVED

Manufacturers of TOURNAPULLS*, ANGLEDOZERS*, BULLDOZERS, TILTDOZERS*, CARRYALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, TOURNATRAILERS*, TOURNACRANES*, TOURNATRUCKS*, SHEEP'S FOOT ROLLERS, TOURNAROPE*, TOURNAWELD*, TOURNALIFTS*.

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